

Alfred P. Sloan Foundation

ANNUAL REPORTS

Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr. (1875-1966)

REPORT for 1974



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President's Statement

President's Statement



SINCE its founding in 1934 the Alfred P. Sloan Foundation has included the field of economics among its program interests. In fact, in its earliest report, published in 1939 after the Foundation's first year of full scale operation, it was asserted: "By decree of its Board of Trustees, the Foundation has, since January 1, 1938, devoted its resources exclusively to the field of American economic education and research." In 1938, grants totalling \$283,000 were made, all of them associated with the general field of economics.

In time other interests were added to the program of the Foundation: management education, science and engineering, and cancer research. By the decade of the 1950's economics was no longer one of the Foundation's principal activities. During the decade of the 1960's and during the present decade support of economics declined. In the five year period ending in 1973 less than three per cent of the Foundation's grants were directly within the field of economics, and almost all of that support went to two institutions, the Brookings Institution and the National Bureau of Economic Research, for advanced economics research.

3 In recent decades, a new perception of economics has come to take hold. There exists among most professional economists no great disposition to believe that the totality of the "laws of economics" yields a single set of inescapable consequences. Rather, there is held to be a freedom to exploit those laws in a fashion such that the consequences resemble what one would

wish them to be. An economic situation, in this view, is not a state imposed upon society by the inexorable workings of economic law, but rather a condition that can in many important respects be altered somewhat at will by society in response to society's own wishes.

More recently, the explosive growth in the capacity to store, retrieve and process data has provided the economist with more and more detailed knowledge about the economy. More and more that knowledge can be rearranged and manipulated in the development and testing of new concepts and in the provision of new knowledge.

The professional economist has come to play a more substantial role in government and in business. In the last decade or so the public in general has come to take heed of economics and at times, unfortunately, to look upon the economist as part soothsayer and part healer. Faith in economics, however, is not matched by a faith in the economists. Prevalent is the view that economics might well be our savior if only economists understood it better. Significantly, that view is not radically different from the view held by the professional economists themselves. Faced simultaneously by recession and inflation, society suddenly has generated a deep concern with matters that were once restricted to academic debate. The Gross National Product, the inflation rate, the international balance of payments, and import quotas on crude oil are matters widely discussed by the general public. There is little reason to believe that this new awareness, and the demands it makes upon economists, will soon diminish.

Late in 1973 the Foundation embarked upon a series of consultations with academic and business economists which extended in one form or another through most of 1974. Several interesting and unexpected areas of broad agreement among the economists emerged. Three of them were negative. There was general agreement that the field of macroeconomic research, dealing with such matters as balance of payments, economic indicators, general tax policy and the like, was by and large already generously supported and represented no major opportunity for the Foundation. There was similar agreement that formal education in economics was not the field in which the Foundation should be active for reasons that varied with the educational level under discussion. There was unanimous agreement that the Foundation should steer clear of ventures into television, or films, or other direct undertakings intended to stimulate the public understanding of economics.

In two respects the consensus was positive and broadly supported. The economists believed there were major opportunities for research on micro-economic problems and that there was a clear need for the better training
4 of journalists dealing with economics. They concluded that the specific questions that constituted immediate problems for the industrialist, the

manager, the entrepreneur and the public servant were not being adequately attacked. While the field of economics was rich in theoretical understanding, the necessary next step to application on something less than the global or national scale was not being taken in an adequate way. Neither did there exist any broad and concerted effort to train a new breed of economists who would look upon such problems as a challenging and prestigious field in which to work. With respect to the reporting of economics in the medium of print or television, it was the view of the economists that only a few newspapers were truly well served.

The program upon which the Foundation has now embarked is based upon these two conclusions. Over the next five years, beginning in 1975, the Foundation plans to make available through university graduate departments of economics substantial support for faculty and graduate students in the various areas of microeconomic research and education. Each grant is to be for a period of three years; and upon review may be renewed for a subsequent two years. Two such grants were made in 1974 to Stanford University and to the University of California at Berkeley.

During 1974 the Foundation, with assistance from economists and journalists, drew up plans for a fellowship program in economics for working journalists. Late in 1974 the decision was made to award a grant to Princeton University which proposed to have such a program in its Woodrow Wilson School of Public and International Affairs. Details of this program, as well as of the two programs in microeconomics, will be found subsequently in this report.

Special notice should be taken of those who assisted the Foundation in shaping these new programs. An advisory committee for the economics program consists of Professor Robert M. Solow of the Massachusetts Institute of Technology, Chairman; Dr. Kermit Gordon, President, the Brookings Institution; Professor Lee W. Hansen, University of Wisconsin; Professor John R. Meyer, Harvard University, President of the National Bureau of Economic Research; and Professor George J. Stigler, University of Chicago. The shaping of the journalism program was in large part the work of Dean Donald E. Stokes, Professor David F. Bradford, and Professor Charles H. Berry of the Woodrow Wilson School of Princeton University; Professor James Tobin of Yale University; and Dr. Leonard Silk of the *New York Times*. Important contributions were also made by Norman Macrae, Deputy Editor of *The Economist*, who produced for the Foundation a working paper based on the disparate comments made to the Foundation by some twenty consulting economists.

his G. Wassell

Particular Programs

THE CONCEPT of Particular Programs, adopted by the Foundation in 1969, enables the Foundation to concentrate specified resources for limited periods of time on three or more sharply defined problem areas, while continuing to pursue its established interests through the General Program. A Particular Program usually involves an expenditure of from \$10 million to \$15 million over roughly five years. The first such program, focused on Minorities in Medicine and Management, came to an end in 1974 while a new one, concerned with Minority Engineering Education, arose to take its place. The two other Particular Programs, dealing with Technology in Education and with Neuroscience, continued in full operation.

Minority Engineering Education



BY 1982, members of minority groups should make up 18 per cent of all freshman engineering students in the United States, compared with 5.1 per cent in 1973. This is the goal established as a reasonable one by a Sloan-supported task force which for more than a year studied present and future enrollment trends and minority participation in engineering education.

The task force's report,* published by the Foundation late in 1974, assembles all the available data on minority engineering enrollment and sets forth 20 recommendations for reaching the 1982 goal. (Based on 1970 census data, approximately 18 per cent of all persons reaching college age in 1982 will be members of the four minority groups considered in the report—Blacks, Chicanos, Puerto Ricans, and American Indians.)

Lack of adequate financial aid was identified by the task force as the single most important barrier to expanded minority engineering enrollments. It projected a need for \$68 to \$106 million in new scholarship aid beyond all currently identifiable sources, over the next nine years and recommended establishment of a new national organization whose function would be the raising and administering of such funds.

Expanded pre-college programs were recommended, to interest and motivate students toward engineering at earlier ages, and to prepare them for engineering study. Engineering schools were urged to strengthen

* *Minorities in Engineering: A Blueprint for Action*. A report of The Planning Commission for Expanding Minority Opportunities in Engineering. 220 pp.

Employment
Prospects:
Excellent

remedial and tutorial programs, in order to reduce their losses of otherwise qualified students, and to improve their programs' articulation with two- and four-year colleges from which students transfer into engineering programs.

The 17-member task force, headed by Dr. Louis Padulo, associate professor of electrical engineering at Stanford University, and including representatives of government, industry, professional societies, and minority organizations, pointed out that career opportunities in engineering are excellent. Some observers foresee shortages of engineers in the near future, and even in the lean period of 1970-72, overall engineering unemployment never exceeded 3 per cent. Starting salaries offered candidates for bachelor's degrees in engineering in 1974 were higher than those in any other field.

Moreover, because of recent declines in enrollment, engineering schools have considerable unused capacity. Admission to them therefore is less intensely competitive than in some other professional fields. Freshman engineering enrollments dropped nearly 30 per cent between 1969 and 1973. Preliminary data from the Engineering Manpower Commission of the Engineers Joint Council suggest a reversal of this trend with the class entering in the fall of 1974, which may be as much as 18 per cent larger than its predecessor. The number of blacks entering in 1974 appears to be 34 per cent greater than in 1973, and Spanish-surnamed students increased by 23 per cent—which is heartening news. But even if the over-all 18 per cent freshman increase is confirmed, the 1974 freshman class will still be smaller than every previous one from 1954 through 1970; and the graduating class, down 5½ per cent in 1974, is expected to be even smaller for the next three years.

Thus it appears that opportunities for new engineers over the near future should be plentiful. The task force report singles out another reason why engineering should have special appeal to minorities: increasingly, engineering is concerned with such problems as housing, sanitation, transportation, and pollution, with which minorities are personally familiar.

As the Foundation's Particular Program on Minorities in Medicine and Management (see Page 13) made its final major commitments in 1974, activity under the Particular Program on Minorities in Engineering began to accelerate. Grants were made for several of the purposes suggested in the task force report just cited.

The problems of introducing greater numbers of minorities into the profession of engineering are nowhere more acute than in the case of the American Indian. Sequestered for the most part on reservations, Native Americans face peculiarly intense problems of cultural adaptation in existing institutions of higher education. The University of New Mexico, situated

The Relation
to Minority
Concerns

The Principal
Requirement:
Financial Aid

in an area of large Indian population, has established close ties with Indian communities and has made special efforts to accommodate them in its programs. A graduate management program, established with Sloan support in 1972, is producing qualified Native American managers.

New Mexico's College of Engineering proposed in 1974 to initiate a special program to train Native American engineers. These are greatly needed by the tribes and pueblos whose lands cover large reserves of mineral resources, which are beginning to be commercially exploited.

A Program in Engineering for Indians

The New Mexico program proposes to bring forty Indians a year into engineering or pre-engineering studies. After a two-week orientation period most of them would enroll at a branch of the University or a community college for a special preparatory year; perhaps ten would enroll directly as engineering freshmen. Through special courses, counseling, tutoring, and other measures, the College of Engineering hopes to bring a majority of each group to academic self-sufficiency by the end of their sophomore years.

The Foundation granted \$330,700 for the first three years of the New Mexico program.

Programs of active recruitment of minority students into engineering studies are designated by the Sloan-supported task force as an absolute necessity for achieving racial parity in engineering enrollments. Much of this effort will take place at the secondary-school level, at a time when students' career plans are most flexible. Michigan State University's College of Engineering, however, sees an opportunity to recruit minority students already at the University who have enrolled in social sciences and liberal arts but who wish to change career objectives. The problem is how to enable such students to make the transition to technical studies without unduly extending their time in college.

Easing the Transition to Engineering

To ease this transition, Michigan State is developing a series of self-paced, modular courses in mathematics and the sciences which can be taken during summers or the regular term. The courses can be individually adjusted for students of varying degrees of preparation, to enable them to achieve in the shortest possible time the mastery of mathematics and basic science needed for engineering study. Reinforcing the course work will be minority student teaching aides, exposure to successful minority engineers, and close counseling by faculty. Similar courses will be used in summer programs for students in high school who plan to study engineering.

Michigan State expects to serve at least 350 minority students during three years of this experimental program. The courses developed, if the program is successful, and the experience gained will be disseminated to other schools. The Foundation made a three-year grant of \$328,000 for this program.

The pressing need for scholarship support for minority engineering students is the concern of the newly incorporated National Fund for Minority Engineering Students. The Fund, established initially under the auspices of the National Academy of Engineering, will seek to assist minority engineering students in much the same way as National Medical Fellowships, Inc., aids minority medical students. Corporations, foundations, and other private donors will be invited to contribute scholarship funds which will be administered by the Fund. The goal for the first year of operation is \$1,348,000.

For the initial operations of the National Fund for Minority Engineering Students, the Foundation made a grant of \$75,000 to the National Academy of Engineering, payable in 1975 to the National Academy of Sciences.

A principal recommendation of the task force report is that the six traditionally black universities having engineering schools be supported in operating closer to their maximum levels. These six schools over the past five years have produced nearly half the black engineering graduates in the United States; but in 1974 they were operating at only about half their capacities. The traditionally black engineering schools, which emphasize flexible admissions and compensatory and supporting services, are especially attuned to the needs of minority students. Their rate of retention, in fact, was found by the task force to be significantly higher than that of engineering colleges in general.

Black Schools of Engineering Assisted

The Foundation in 1973 made grants of \$100,000 each to strengthen three of the traditionally black engineering schools (North Carolina Agricultural and Technical State University, Prairie View A & M University, and Tuskegee Institute). In 1974, grants of \$100,000 each were made to the other three:

HOWARD UNIVERSITY is expanding its work with high-school students, teachers, and counselors to increase the flow of engineering applicants. There is evidence of success: freshman engineering enrollment rose from 68 in 1972 to 139 in 1973, and is expected to rise to 200 in 1975. The Sloan grant will partially support these activities, as well as a summer pre-freshman program, financial aid, and intensified efforts at retention.

SOUTHERN UNIVERSITY AND A & M COLLEGE, in an effort to expand its engineering enrollment, is increasing its recruiting in high schools and offering a six-week summer program for students who have completed the 10th or 11th grade. The students are introduced to the skills and techniques used in engineering study and are presented with typical engineering problems to be solved using a team approach.

TENNESSEE STATE UNIVERSITY is using a Sloan grant principally to expand recruiting activities. The School of Engineering has engaged a full-time recruiter to augment visits by faculty-student teams to secondary schools, and is conducting conferences on engineering opportunities for high-school counselors and science

teachers. Newspaper and broadcast advertising for applicants is being increased. To improve the rate of retention, the hours and staff of the School's engineering tutoring center are being expanded.

To enable the task force on minority opportunities in engineering to complete its work, Stanford University received two grants totaling \$32,000 in 1974.

Other grants for minority engineering education in 1974:

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.: For expansion of a pilot program to enhance minority participation in engineering education . . .	\$15,525
CLARKSON COLLEGE OF TECHNOLOGY, Potsdam, N.Y.: For partial support of a pre-college summer institute for Native Americans interested in engineering . . .	\$10,000
OLIVE-HARVEY COLLEGE, Chicago, Ill.: For partial support of an experimental pre-engineering summer training program . . .	\$ 6,000
PRATT INSTITUTE, Brooklyn, N.Y.: For terminal support of REAP, a Repayment Educational Assistance Program for disadvantaged minority engineering students . . .	\$20,000
UNIVERSITY OF WISCONSIN, Madison, Wis.: For partial support of a pre-engineering summer program for minority high school students . . .	\$16,400

Minorities in Medicine and Management



THE first of the Foundation's Particular Programs, designed to expand opportunities for minorities in the professions of medicine and management, reached its formal conclusion in 1974 with the award of grants totaling \$2,343,000. Over the ten years beginning in 1965 the Foundation has invested \$7.5 million in minority medical education and \$5.9 million in minority management education, the bulk of it during the five years of the Particular Program.

Progress in Minority Enrollments

There is reason for modest satisfaction in the results achieved. Enrollment of minorities in U.S. medical schools stood around 2 per cent in 1967; by the Fall of 1974, minority students made up 10 per cent of the freshman medical class. The nation's graduate schools of management enrolled only 55 black students altogether in 1967; by the 1973-74 academic year there were about 640 black and other minority students in accredited graduate management programs. Some 345 of these are receiving fellowship support from two consortia established by 16 schools to expand minority graduate management enrollments.

Other indices could be cited—the greatly increased number of fellowships available for minority students in medicine and management and the substantial rise in dollar support for them from corporations, foundations, and other private donors; the many new special programs in the professional schools to attract, retain, and graduate minority students; and the generally greater awareness of the desirability of training larger numbers of minority physicians and managers.

Just because these gains have been substantial, however, it became more difficult to make further ones. For some institutions in this area it becomes a struggle to maintain the progress and the new operating level which they have achieved. In the current economic atmosphere of recession and retrenchment, institutions must work harder to maintain private contributions, and government interest appears to be declining.

As the Particular Program on Minorities in Medicine and Management reached its scheduled terminal point, therefore, the Foundation's final major grants in this area were designed to place several key institutions and programs in the best possible position to continue in an uncertain future. Most of the grants covered a transition period of up to three years.

**NMF:
Primary Source
of Student Aid**

For the minority student who aspires to enter medical school, one of the first places to turn for assistance is National Medical Fellowships, Inc. which currently is helping to support 65 per cent of all first-year minority medical students. Founded in 1946 to provide financial help for black medical students, NMF operated on a small scale until the late 1960s. In 1968 it was assisting 134 students; this number doubled to 270 in 1969.

As the drive for more nearly equal representation in medicine gained momentum in 1970, NMF's growth accelerated sharply with the first major support under the Sloan Particular Program; it assisted 598 students in 1970. Also in that year NMF began to provide fellowships for minorities other than blacks—principally Mexican-Americans, Mainland Puerto Ricans, and American Indians. The total number of fellowships rose to 1,760 by 1973 and 1,840 by 1974.

In dollar terms, fellowship awards by NMF rose from \$920,000 in 1970 to \$2,291,500 in 1974. Annual Sloan grants, principally for fellowship support, reached a peak of \$1 million in 1972 and began to taper off thereafter.

**Assisting
Students
in 109 Schools**

NMF awards are concentrated in the first two years of medical study, although a few are made to upperclassmen who have incurred heavy debts. Of the 1974 awards, 20 per cent were to minorities other than blacks and 32 per cent were to women. Students at 109 medical schools are being helped, at an average grant of \$1,245, down slightly from 1973. This amount, of course, is but a fraction of the cost of a year in a school of medicine; the balance must come from the medical school's aid funds, from loans, and from self-help.

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With National Medical Fellowships established as a major institution for support of medical education, enjoying support from a variety of foundation and corporate sources, and with the Foundation's Particular Program approaching termination, considerable thought was given in late 1973 and in 1974 to assuring NMF's future institutional strength and viability. It was evident that expanded efforts would be needed to maintain and increase

corporate and foundation contributions. The Sloan Foundation therefore agreed to help support a reorganization of NMF through which its small staff would be augmented by a full-time career president, a professional fund raiser, a research assistant, and necessary clerical staff. The Foundation agreed to provide \$150,000 a year for three years for support of the expanded operation, and a final grant of \$400,000 for fellowships, or a total of \$850,000. NMF may use \$50,000 of the operating funds for special projects such as research, information gathering, and other activities to increase minority representation in medicine.

A program regarded as crucial to expanding the number of minority physicians is the Accelerated Medical Education Program of Howard University's College of Medicine, initiated in 1971 with Sloan support. The program shortens the time required to reach the M.D. degree through two component programs: (1) An Early Entrance Program allows a limited number of sophomore and junior students in the College of Liberal Arts to enroll in the College of Medicine and to complete the requirements for both the B.S. and M.D. degrees in six or seven years instead of the usual eight years. (2) A Shortened Curriculum Program reduces the traditional four-year curriculum of the College of Medicine to 33 months for some students.

**Accelerating
Medical
Education**

The Accelerated Medical Education Program at Howard has proved itself a viable means of speeding the entry of blacks and other minority persons into the medical profession. Its first seven graduates are now serving their internships in hospitals around the country, and 20 more are scheduled for graduation in 1975.

Howard, with an entering medical class of 128 in 1974, admits 40 students a year to the accelerated program. The program requires additional faculty time which the College of Medicine has not yet been able to support from its regular funds. The Foundation made a terminal grant of \$315,000 to make additional faculty available and to help sustain the program for another three years. At the end of that time, Howard expects to be able fully to support the program from its own funds.

Since 1969 the Foundation has taken an interest in the Pre-Medical Research and Education Program (PREP) of the New York University School of Medicine. In the recruitment of talented minority high-school students into medical and later premedical studies, PREP has grown to be one of the largest and most effective regional programs in the country. During its first four years about 500 students have graduated from the program and have gone on to premedical studies at leading colleges and universities.

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PREP recruits promising minority students from New York City high schools who show an interest in medicine. They attend a laboratory course

for three hours each Saturday at the School of Medicine during the academic year, and are placed in summer jobs in hospitals and laboratories. Upon graduation they attend an intensive six-week summer program to give them extra preparation for college-level studies. PREP endeavors to follow them through their college and medical school careers and to provide assistance as needed.

With the impending termination of the Foundation's Particular Program, PREP received a three-year forward commitment of \$180,000, bringing total Foundation support of this activity to \$357,000.

A program at Stanford University seeks to increase the number of minority applicants to Stanford's and other schools of medicine by exposing 35 Stanford undergraduates each summer to a special premedical program. The program seeks both to reinforce the students' academic assets through course work and tutoring; and to enhance their motivation and experience through work in the Stanford Medical Center, discussions with physicians, and observations of doctors at work in various settings.

The Foundation granted \$98,000 for the 1974 and 1975 summers of the Stanford premedical program. Lesser support was provided for the 1973 program.

Management education for minorities has been stimulated greatly by the activities of two consortia which currently are supporting a total of 345 minority students in 16 leading graduate schools of management. Terminal grants were made to help preserve and strengthen these two consortia.

In 1970 ten graduate schools of management* formed the Council for Opportunity in Graduate Management Education (COGME) with initial Sloan support of \$1 million. Its purpose was to stimulate the flow of minority students into graduate management programs in the member schools. By acting in concert they hoped to accomplish more in this direction than by pursuing separate courses. Their collective minority enrollments have increased from 257 in 1969, the year before COGME, to 520 in 1974. (The latter figure, however, represents a decline from the peak year of 1971, when 606 minority students were enrolled.)

COGME maintains an active recruiting program; its representatives meet with students on about 100 college campuses each year, and it distributes informational materials to many other colleges and organizations. Its principal focus, however, is upon closing the gap between minority

*University of California-Berkeley, Carnegie-Mellon University, University of Chicago, Columbia University, Cornell University, Dartmouth College, Harvard University, Massachusetts Institute of Technology, University of Pennsylvania, and Stanford University.

More Growth
Requires
More Effort

172 Students
Being Aided
by Consortium

students' means and aspirations through fellowship support. More than 600 students have benefited from COGME fellowships since 1970. In the current year 173 students, or one third of the 520 minority students in member schools, are receiving COGME support. Fellowships currently in effect average \$3,600 for first-year students and \$2,000 for second-year students, for a total amount of \$471,650.

The fellowships are intended to meet about 60 per cent of the demonstrated need of the student; the remainder typically is financed by loans from the universities. Steadily rising tuitions and living costs, together with a scarcity of university funds, have made it impossible to expand the number of COGME fellows in recent years. Corporate contributions have grown, from \$28,000 in 1971-72 to over \$300,000 in 1973-74, and further growth must be sought in a period of economic recession—no simple task.

The need for COGME and similar programs, however, will continue. The demand for trained minority managers remains firm; and applications for COGME fellowships reached a record 725 in 1974. The Foundation, in terminating its major interest in this area, made a grant of \$600,000, payable in declining amounts in 1974, 1975, and 1976. (Harvard University, as fiscal agent for COGME, was the official recipient of the grant.) This brought the Foundation's five-year investment in COGME to \$3,320,000.

The Consortium for Graduate Study in Management, composed of graduate management schools at six universities,* was established in 1967 with the objective of hastening the entry of minority men and women into management positions. Like COGME, it engages in recruiting for the member schools and raises funds for fellowship support of their minority students. Currently it is supporting 172 students on fellowships which average \$3,842, the individual amounts varying with the tuition levels of member schools.

A new feature was added to the Consortium program in 1971 with the aid of a \$500,000 Sloan grant. This was the training of minority managers for public and not-for-profit organizations such as hospitals, public and private schools, cultural enterprises, and governmental agencies. The Sloan funds supported the training of 55 such minority managers, and there is evidence that the program has served to heighten interest among the schools and their students, minorities and others, in management education for other than business careers.

The Consortium has been unusually successful in securing corporate support, which provides the bulk of its funding. The participating univer-

*Indiana University, University of North Carolina, University of Rochester, University of Southern California, Washington University, and University of Wisconsin.

Expanding
Enrollments
in Management

sities also have gradually increased their support for Consortium activities, largely through tuition remissions and contributions of faculty time. The Consortium expects eventually to transfer all of its functions—student recruiting and fund raising—and its “know-how” to the member universities. In the meantime, there is a need for extra funds to assure continuance of the not-for-profit program and to maintain a general level of activity sufficient to attract continued corporate and other support. The Foundation therefore approved a terminal grant to the Consortium of \$300,000 payable in descending amounts over a three-year period, bringing its total support of Consortium activities to \$820,000.

Technology in Education



THE Particular Program on Technology in Education, initiated in 1971 with a series of relatively small exploratory grants, moved into a phase of major grants for major projects in 1974. The technological means employed by the various investigators are diverse, but they share a common purpose—the search for ways of using technology to enhance the effectiveness of teaching.

The use in higher education of communications systems with abundant channel and data-carrying capacity has long been discussed, and most of the needed technology is available; but thus far such communications systems have not materialized. Instructional television remains at a rudimentary stage of development. A basic exploration by outstanding scholars of the teaching and learning possibilities inherent in the powerful technology of television has yet to be made. That deficiency may be remedied, however, by a major institutional project now in progress at Massachusetts Institute of Technology.

The MIT project, briefly stated, calls for installing a pilot communications system of high capacity on campus and experimenting with its use. It is essentially a research and development program and a modest beginning for what might eventually become a campus served throughout by a system of abundant channels that can be used for instructional television, computer-assisted instruction, and many other purposes.

On the hardware side of the endeavor, MIT is installing an 18-channel, two way communications system reaching from one side of the campus to the other, with connections to dormitory common rooms, classrooms, library and medical and athletic facilities, and to other points. MIT's Center for

*Increasing
communications
at MIT*

Advanced Engineering Study will provide the initial facilities for the program origination.

At the same time, experimental programming will be under development by faculty members and students from 10 schools and departments, including the Sloan School of Management, engineering, architecture, biology, political science, and the Electronic Systems Laboratory. In time it is expected that MIT's extensive computer system will be linked to the multi-channel system for use in instruction, data transmission, and research.

The commitment of leading MIT faculty members, plus MIT's long experience with technical research and development problems, led to a Sloan Foundation grant of \$620,000 for the first 18 months of this program.

Research by mathematicians, engineers, and scientists at California Institute of Technology over the past 12 years has brought about significant advances in the use of computers for understanding the processes by which the brain and central nervous system function in learning. Caltech is now taking steps to apply these insights to its own instructional program.

One aspect of the Caltech project will be the development of an "interactive classroom" in which the computer is brought directly into the lecture process. Questions which arise during the lecture may be explored immediately by an instructor and undergraduate students, with the computer's end of the "conversation" displayed on a large screen. This innovation will require a complete review of the courses involved and development of special data banks and computer programs for them. This project will be coordinated with a substantial revision of the undergraduate curriculum in which mathematics will be given a special emphasis.

The same faculty group also will seek to develop the instructional potential of its knowledge of how learning takes place. The group has learned a great deal about the physiological and psychological ways in which human beings process information received through their senses and the ways in which they synthesize many bits of information into judgments and theories. It now seems possible that the group can find ways (using the computer as a primary tool) of systematically fostering the ability of talented students to think creatively. The student is presented with an actual scientific experiment or case history and a bank of data about it. From this he can learn how the accepted solution was reached, and may also learn to speculate, beyond the data, about other possible solutions. Initially this work will be conducted with advanced graduate students, but the Caltech group foresees that the method in time might be used in the undergraduate curriculum as well.

For the Caltech experiment in educational technology the Foundation granted \$400,000, payable over three years.

New York Institute of Technology, a private institution based on Long

Employing
Knowledge
About Learning

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Island, has had considerable experience in adapting educational technologies to the needs of its diverse student body. It offers a wide variety of undergraduate and graduate courses preparing students for careers in industrial design, production, and management, as well as special programs for mid-career people from the aerospace industry, the airlines, law enforcement and engineering. Its technical facilities are extensive. The Institute produces technology-based curricular materials for its own use, and frequently for outside users.

The Institute now is undertaking, with the use of a variety of instructional technologies, to bring all its experience to bear on rebuilding the basic curriculum that it requires of nearly all undergraduates. A few courses already are taught this way, with the student's progress monitored by computer; the Institute believes that conversion of the entire basic curriculum to this kind of format would improve the quality of teaching and learning, while at the same time sharply reducing costs.

This ambitious experiment, if successful, will provide a valuable demonstration of the potential uses of technology in education. The Foundation made a two-year grant of \$375,400 for its support.

The so-called "knowledge explosion" with its attendant rapid multiplication of scholarly books and journals has led to an alarming rise in the costs of operating libraries, and particularly the great research libraries upon which scholars in all disciplines depend. A consortium of four major research libraries—Harvard, Yale, Columbia, and the New York Public Library—has determined to see whether a pooling of resources through the use of new technologies will at least reduce the rate of increase in their costs.

The Research Libraries Group, as the consortium is called, will have a computerized bibliographic center at Yale University, to determine where within the four libraries a specific item may be found and how it can best be gotten to the user. Improved telephone and teletype networks are planned to make materials rapidly available throughout the consortium. The Group expects to devise a means of sharing periodicals, making it unnecessary for each library to maintain serials in all fields. Acquisition of rare and expensive books also may be shared, and joint efforts initiated to develop improved techniques for preserving existing collections, many of which are deteriorating. The four libraries foresee that, once the feasibility of the consortium is demonstrated, other libraries will be invited to join and perhaps a regional network will be developed.

Toward the start-up expenses of the Research Libraries Group over its first three years the Sloan Foundation granted \$350,000, payable to Yale University.

Two educational experiments by distinguished scholars are in progress at Harvard University with Sloan support. Professor Francis H. West-

Seeking More
Efficiency
in Instruction

Libraries
Combine
Resources

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heimer is applying computer-assisted instruction to two topics in his basic organic chemistry course, chemical synthesis and qualitative organic analysis. Professor Edward M. Purcell, a Nobel laureate, is building large-scale demonstration equipment for elementary physics courses. This work represents an expansion of his previous experiments in the construction of extremely large models, such as a six-foot-long solenoid, visible throughout a lecture hall. Two-year Sloan support for the two Harvard projects is \$89,000.

The Foundation's interest in the experimental use of television in higher education led to a grant of \$35,000 to the University of Connecticut which will support a multi-disciplinary group of scholars from that institution, Wesleyan University, and Yale University in a re-examination of instructional television. The group and its consultants will appraise past efforts in this field and attempt to predict what future experiments may be fruitful.

Other grants for projects in technology in education in 1974:

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.:
For completion of an experiment in the use of color television in teaching biology to non-science majors \$20,000

For a study of instructional technology in the teaching of science, to be administered by the Lawrence Hall of Science \$ 8,400

UNIVERSITY OF CALIFORNIA, Santa Cruz, Calif.: For renewed support of development work in computer-assisted instruction in organic chemistry . . \$11,200

CASE WESTERN RESERVE UNIVERSITY, Cleveland, Ohio: For a project to test the effectiveness of video-based and computer-based modules in teaching certain remedial and beginning elements of engineering \$17,500

COLORADO STATE UNIVERSITY, Fort Collins, Colo.: For partial support of an evaluation of an interinstitutional television-based course in biology . \$15,000

EDUCATION DEVELOPMENT CENTER, Newton, Mass.: For planning costs in the development of an educational television series on the history of American technology \$20,000

KNOX COLLEGE, Galesburg, Ill.: For terminal support of a computer- and audio-visual-tutorial-based course in accounting, directed especially at the disadvantaged student \$ 6,275

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.: For partial support of the establishment of a computer base for an experimental program in engineering education \$14,300

22 MICHIGAN STATE UNIVERSITY, East Lansing, Mich.: For preparation of a technology-based course in physics, to serve as a model for further development and for faculty training \$19,800

MIDDLEBURY COLLEGE, Middlebury, Vt.: For a pilot project in the teaching of German that will use current video materials from West Germany and explore whether they can be disseminated through a self-supporting subscription service among American colleges \$ 5,000

NORTHWESTERN UNIVERSITY, Evanston, Ill.: For evaluating a low-cost video system as an instructional tool and for developing instructional materials for it \$19,900

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.: To support a demonstration project in the application of instructional technology to the undergraduate engineering laboratory \$19,000

YALE UNIVERSITY, New Haven, Conn.: For development of experimental instructional programming for the University's GEM interactive computer system \$11,200

Neuroscience



IN its support of neuroscience, the study of the brain and its relationship to behavior, the Foundation began in 1970 its efforts to strengthen major centers of excellence in this new discipline, as well as to assist promising exploratory research activities. Four years later a review of progress seemed in order, and the Foundation called together a panel of distinguished neuroscientists to make recommendations to the Foundation's Neuroscience Advisory Committee.

The outcome of this process was a decision, early in 1974, that the Foundation could best contribute to the continuing development of neuroscience as a discipline by supporting young people in programs having distinguished senior members representing a broad cross section of neuroscience. Accordingly, most of the \$1,610,300 granted for neuroscience in 1974 went to programs in which the training of young neuroscientists at the pre- and postdoctoral level was the principal element.

Additionally, eight young neuroscientists received awards of two-year support through the Sloan Fellowships for Basic Research (see Page 34).

One of the earliest institutional indications that neuroscience had become a distinct discipline was the establishment of a Department of Neurobiology at Harvard Medical School in 1966. Since that time the Department has grown from five to nearly forty academic members who bring skills from numerous disciplines to bear on problems in neuroscience. Among the principal areas of research are studies of how communication between nerve cells occurs, and how connections between nerve cells change in relation to behavior.

Research in
Neuroscience
at Harvard

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A New
Initiative
at Columbia

A limited number of graduate and postdoctoral students are admitted to the Harvard neurobiology program and are integrated as closely as possible into its daily affairs. Scientists trained there hold faculty positions at leading institutions throughout the world. To continue this kind of training, Harvard received a grant of \$240,000 payable over three years. (A 1972 grant for support of visiting senior investigators in the Harvard program continued in effect in 1974.)

In July of 1974 Columbia University formed a new Division of Neurobiology and Behavior which bridges the departments of physiology, neurology, and psychiatry in the Columbia College of Physicians and Surgeons. The Division is headed by Dr. Eric Kandel who, with a group of his associates, has moved to Columbia for this purpose.

Columbia possesses a number of highly regarded scientists who, under the stimulus of the new Division, can be expected to make important contributions to interdisciplinary studies in neuroscience. Columbia scientists previously have produced new insights into, for example, distortions in the sense of touch and the link between simple learning and the release of specific chemicals in certain brain cells.

The active research program at Columbia offers young scientists and advanced graduate students an opportunity to learn most of the important techniques of neuroscience. Formal courses, seminars, and workshops complement the research experience. Primarily for this training aspect of the Columbia program, the Foundation granted \$360,000, payable over three years.

(A research project initiated by Dr. Kandel and Dr. W. Alden Spencer at New York University with Sloan support in 1972, concerning the structure of certain nerve cells, was transferred to Columbia along with \$126,200 remaining in the NYU grant. See the Report for 1972, Pages 24 and 25.)

Another promising site for development of a highly interactive neuroscience program is at George Washington University. Three closely related groups of scientists from that institution together with investigators at the National Institutes of Health are studying the chemical and physical architecture of cells in simple nervous systems and in cell cultures. The central question of how nerve cells "recognize" and form connections with other nerve cells is being studied using a variety of chemical, physical and electrical techniques.

A three-year grant of \$180,000 was made to George Washington, principally for support of postdoctoral fellows who can be expected to develop new lines of research combining the multidisciplinary approaches of their mentors.

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At Case Western Reserve University a decision was made to establish

Studying
How Cells
Connect

a Neurobiological Unit in the Anatomy Department of its Medical School. Six Anatomy Department faculty members participate full time in the research and training work of the Neurobiology Unit, and more than twenty members from seven other departments are involved from time to time. Case Western Reserve neuroscientists, applying a broad spectrum of disciplinary approaches, have made important discoveries in the areas of nerve cell growth, the visual system, and interactions between nerve cells and surrounding cells. Younger scientists and postdoctoral fellows perform important functions in this research, and it was primarily for their support that a three-year grant of \$180,000 was approved.

A similar program at the University of California, San Francisco, is housed in the Department of Physiology. There the neuroscience program directly involves 13 members of the Physiology Department in addition to members of other departments. Principal research interests are the biology of nerve cells, the functioning of sensory systems, and the effect of certain hormones on brain cells and behavior. For support of pre- and postdoctoral fellows in this program the Foundation granted \$120,000, payable over three years.

The cellular processes involved in learning and memory—the question of how organisms acquire, store, and “read out” information—continue to largely elude neuroscientists, but a group at the University of Oregon has developed analytical techniques which promise to lead to solutions of this fundamental problem. A primitive form of learning in the simple nervous systems of insects, involving avoidance of electric shock, is being studied with the aid of a computer program. Analyses of the changes in nerve cells associated with this “learning” are being undertaken. Oregon has facilities available to accelerate this research, and has requested support for graduate students and postdoctoral fellows to assist in the work. A three-year grant of \$90,000 was approved for this purpose.

A 1972 grant to stimulate growth of a center of excellence in neuroscience has helped to add strength to the interdepartmental Neurobiology Program at the University of North Carolina, Chapel Hill. Six new faculty members, mostly younger investigators, have been added to the program and have helped to stimulate new interdisciplinary projects in areas of sensory neurobiology and aspects of neurochemistry. A cohesive training program, designed to expose young scientists to a broad range of neuroscience problems, has been instituted. Through a visiting scientist program and increasing contacts with neighboring institutions, the program seeks to continue to expand in breadth.

During 1974 the Foundation made a review of progress in the Neurobiology Program at North Carolina and, in keeping with an earlier understanding, approved a final three-year grant of \$350,000 for its support

The funds will be used primarily for support of trainees and junior faculty.

Other grants in 1974 for research and training in neuroscience:

BOSTON UNIVERSITY, Boston, Mass.: To initiate a neurobiology training program at the Marine Biological Laboratory, Woods Hole, Mass.	\$19,600
BROWN UNIVERSITY, Providence, R.I.: To support research on neural theories of memory and learning	\$20,000
UNIVERSITY OF CALIFORNIA, San Diego: For partial support of a workshop on brain processes involved in learning, held at the International Congress of Physiological Sciences	\$ 5,000
UNIVERSITY OF FLORIDA, Gainesville, Fla.: To support the application of signal analysis techniques from electrical engineering to the study of potentials recorded from the human scalp	\$19,000
UNIVERSITY OF ILLINOIS, Urbana, Ill.: To assist development of a movement notation system for the description of animal behavior	\$ 4,200
NEW YORK MEDICAL COLLEGE, New York, N.Y.: For interim support of a research project involving adaptation of measurement methods from particle physics to data recorded from nerve cells (two grants)	\$12,500
WASHINGTON UNIVERSITY, St. Louis, Mo.: For partial support of a symposium on new techniques for tracing brain cell connections	\$ 9,987

General Program

THE GENERAL PROGRAM continues the Foundation's traditional interests in science and technology, in economics and management, in education and in problems of society related to those interests. Normally about 60 per cent of the Foundation's resources are devoted to the General Program, the remainder being divided among the several Particular Programs.

Economics and Management



THE Foundation's renewed emphasis on economics, discussed in the President's Statement earlier in this report, led to the first of a planned series of grants for research in microeconomics and to the establishment of a program of fellowships in economic journalism.

Proposals for research in microeconomic subjects were received from a number of leading economic departments. The first two to be funded were from the University of California, Berkeley, and from Stanford University. Both universities received grants of \$210,000 payable over three years.

At Berkeley a workshop of faculty members and graduate students will concentrate on an area which has been somewhat neglected in recent years, the economics of the various systems of transportation. They will look closely at demand and supply relationships in transportation markets. The issue of how to provide public finance for transport facilities will be studied, as will the behavior of agencies which regulate transport activities. A further topic will be the influence of transportation facilities on migration decisions. Berkeley expects that these subjects will stimulate a number of student dissertations and research in related areas not covered by the grant.

At Stanford the focus is on the impact of inflation on microeconomic markets and institutions. Since inflation has become apparently a permanent feature of economic life since World War II, the Stanford workshop will analyze the impact of inflation on labor markets, financial and credit markets, and housing markets. It will also investigate the interaction between taxation and inflation, and explore the microeconomic dynamics of inflation. Specific studies will focus initially on the impact of inflation on corporate accounting and taxation; the impact of inflation on the life insurance industry; sectoral dynamics of the inflation process; and labor markets and inflation.

Timely studies such as those planned at Berkeley and Stanford require

careful interpretation and explanation if their findings are to be widely appreciated and understood. It is here that improved economic journalism, the second aspect of the Foundation's new focus on economics, can be of service. Much of today's news—recession, inflation, petroleum supply, preservation of the environment—has an economic component that requires some degree of specialization on the part of the person reporting it. It is crucial that such complex issues be more widely understood.

Princeton University, therefore, offered to establish in its Woodrow Wilson School of Public and International Affairs a special program of economics fellowships for up to eight working journalists per academic year. Their studies, all at the graduate level, will be a combination of specially designed courses and guided selections from the regular offerings of the University. Included will be quantitative methods and statistics, and a seminar devoted to critiques of economic reporting in a wide range of areas involving the application of economic and statistical methods. The program, directed by Dr. Charles H. Berry, seeks to acquaint the journalists with economists and their work, thus enabling them to deal knowledgeably with economists upon their return to their publications.

Participants in the Princeton program generally will be writers for publications of general readership, between the ages of 25 and 35, who have been nominated by their editors and publishers. Employers will be expected to continue part of their salaries; the Foundation and the University will make up the balance of their expenses and tuition. The Foundation made an initial planning grant of \$75,000 (payable in 1975), and expects to continue support of the program over the next five years.

Graduate management education for the fully employed is being provided through some innovative methods by the Graduate School of Management of the University of California, Los Angeles. There a Professional Masters Program makes possible an advanced degree gained partly through off-campus study. An experimental learning center on campus, which the School hopes to replicate at off-campus locations, enables a student to proceed on his own time through basic management courses with the aid of various instructional media—video and audio cassettes, programmed learning texts, and computer-based course materials.

The UCLA program appeals to a variety of non-conventional students, including a number in public and not-for-profit agencies who feel the need of further training. Others have been working in the private sector for a number of years and are seeking to upgrade their management skills, and some are those who have recently completed their undergraduate education and need or prefer to work full-time while continuing graduate-level studies. The program also accommodates minority persons who could advance in industry and government, given some additional training.

The Foundation made a two-year grant of \$237,000 in support of the UCLA program. An earlier grant supported program planning.

A new initiative in the field of public management or public administration received Foundation support in 1974. Professor James Q. Wilson, head of the department of government at Harvard University, believes it is possible to ask more penetrating questions about how public agencies go about carrying out the policies assigned to them, such as: If the government undertakes a new policy, what are the organizational alternatives for managing it, and the likely consequences, in terms of output, of each? Given an existing policy, what are the possibilities of changing the output by altering the organizational arrangement? What can a client or object of an agency expect from it, knowing its organizational structure and internal processes?

To help answer such questions, and to train part of a new generation of public-administration teachers, Professor Wilson is working with a group of graduate students at Harvard who will be expected to produce dissertations and publications which will help to revitalize the field. Their work is being supported by a three-year Sloan grant of \$143,000.

Another area in which outputs are difficult to identify and measure is higher education. While it may never be possible to specify definitively the outcome of the educational process, educators persist in trying to do so, and upon such judgments decisions are made as to allocation of resources. Dr. Howard R. Bowen, an economist who recently retired as chancellor of Claremont University Center, is now devoting part of his time to studying the outcomes of particular institutions and programs in higher education. His findings are expected to contribute significantly to the national debate on the financing of higher education. Dr. Bowen's study is to continue for three years. The Foundation made a grant of \$59,000 to Claremont for the first year.

Other grants for economics and management in 1974:

AMERICAN ECONOMIC ASSOCIATION, Nashville, Tenn.: For support of a 1974 summer program to increase the number and educational opportunities of minority students in economics \$20,000

AMERICAN ENTERPRISE INSTITUTE FOR PUBLIC POLICY RESEARCH, Washington, D.C.: For a feasibility study for a research center to study government regulation \$19,700

FASHION INSTITUTE OF TECHNOLOGY, New York, N.Y.: For development of a curriculum for a bachelor's degree in marketing and management in the fashion industries \$20,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.: In support of a research project developed by a group of black graduate students in economics \$ 7,500

**Defining
Outcomes
of Education**

Science and Technology



A greater national investment in science and technology appears to be needed if the nation is to overcome some of the problems that became prominent in 1974. The search for new sources of energy, for ways to control air and water pollution, for answers to the world nutrition problem, for more efficient delivery of public services such as health care and education, and for solutions to a host of other problems—all of this points to the need for ever greater numbers of trained scientists and engineers. The call for a higher rate of innovation in some basic industries, such as housing and transportation, emphasizes the need for accelerated research and development and for the people capable of conducting it.

One of the Sloan Foundation's concerns for many years has been the education of engineers who are aware of the economic, social and political implications of technology. Since 1971, twenty-five major grants totaling \$8 million have been made for the specific purpose of introducing such components into engineering curricula. Four of these grants were made in 1974:

California Institute of Technology, aided by a \$150,000 grant, has established a one-year graduate program, optional for students, which consists of an ongoing seminar dealing with current engineering research having social science aspects; and a year-long course designed to introduce participants to principles of the social sciences, especially as they pertain to problems arising in the practice of engineering and government. The first two terms of the course will be taught by social scientists, and the third term jointly by social scientists and engineers.

Vanderbilt University plans to develop, with the help of a three-year, \$363,000 grant, a broad curriculum of courses relating engineering to

**Educating
Aware
Engineers**

economics, sociology, political science, philosophy, and law. The Sloan funds will provide for retraining of engineering faculty, for time to develop new courses, and for interdisciplinary seminars and practical projects in the Nashville area.

Washington University is expanding its Technology and Human Affairs program in its School of Engineering and Applied Science with a grant of \$335,900 which will expire at the close of 1976. The program will add new courses and two social science faculty members. Both bachelor's and master's degrees are offered in Technology and Human Affairs, and a minor in technology assessment is being developed for Ph.D. candidates.

Worcester Polytechnic Institute will use a \$350,000, three-year grant to accelerate the implementation of its WPI Plan, under which students are required to complete a project relating their technical specialization to a societal need. The grant will make possible the addition of social science faculty members and the education of the technical faculty in the social sciences, either on or off campus.

The Foundation's principal contribution to fundamental scientific research, the Sloan Fellowships for Basic Research, has assisted 1,134 scientists at an aggregate outlay of \$23.4 million since 1955. Seventy-eight two-year fellowships, averaging about \$9,000 a year, were awarded in 1974.

Foundation Trustees in 1974 increased the appropriation for the Sloan Fellowships, to \$1,550,000 from the previous level of \$1.4 million. This was done because the addition of neuroscientists to the program in 1971 reduced the number of fellowships available in the more traditional fields of chemistry, physics, and mathematics. The increased allocation will restore those fields to their former levels, and will also make possible about ten fellowships a year for neuroscientists.

The purpose of the Sloan Fellowship program since its inception has been the advancement of fundamental science through investment in creative young investigators at an early stage of their careers. Recipients typically are in their first faculty appointments. They are nominated for fellowships by senior colleagues; direct applications are not accepted. They are afforded a high degree of flexibility in their use of the grant funds and are free to pursue their research wherever it may lead; no specific research proposal is required, but a brief annual progress report must be submitted to the Foundation.

A Program Committee of distinguished scientists reviews nominations, some 500 to 600 a year, and recommends selections to the Foundation. The present membership of this committee is as follows:

Increased Allotment for Research

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DR. MARK KAC, Professor of Mathematics, Rockefeller University, Chairman.
 DR. RICHARD B. BERNSTEIN, Professor of Chemistry, University of Texas.
 DR. T. D. LEE, Professor of Physics, Columbia University.
 DR. CARL PFAFFMANN, Professor and Vice President, Rockefeller University, a neuroscientist.

DR. ARTHUR L. SHAWLOW, Professor of Physics, Stanford University.
 DR. FRANCIS O. SCHMITT, Chairman, Neurosciences Research Program, Massachusetts Institute of Technology.
 DR. I. M. SINGER, Professor of Mathematics, Massachusetts Institute of Technology.
 DR. GILBERT STORK, Professor of Chemistry, Columbia University.

Sloan Research Fellows selected in 1974 are listed below, by their institutions and fields of science:

UNIVERSITY OF ARIZONA
Astrophysics: Peter A. Strittmatter
 BARNARD COLLEGE
Mathematics: Joan S. Birnba
 CALIFORNIA INSTITUTE OF TECHNOLOGY
Neurochemistry: Henry A. Lester.
Neurophysiology: George Zweig, John M. Allman. *Physics:* Thomas C. McGill, Jr., Geoffrey C. Fox
 UNIVERSITY OF CALIFORNIA, Berkeley
Chemistry: Alexander Pines, William M. Gelbart. *Mathematics:* Robert E. Bowen, David M. Goldschmidt. *Nuclear Chemistry:* Luciano G. Moretto
 UNIVERSITY OF CALIFORNIA, Davis
Chemistry: Dino S. Tinti
 UNIVERSITY OF CALIFORNIA, Irvine
Chemistry: Warren J. Hehre
 UNIVERSITY OF CALIFORNIA, Los Angeles
Mathematics: James V. Ralston, Jr.
 UNIVERSITY OF CALIFORNIA, San Diego
Neurobiology: Nicholas C. Spitzer
 UNIVERSITY OF CALIFORNIA, Santa Cruz
Physics: Joel R. Primack, Richard C. Brower
 CASE WESTERN RESERVE UNIVERSITY
Biophysical Chemistry: Anton J. Hopfinger
 UNIVERSITY OF CHICAGO
Physics: John A. Hertz, Paul M. Horn, Chris Quigg
 UNIVERSITY OF COLORADO
Chemistry: George E. Busch
 COLUMBIA UNIVERSITY
Physics: Alfred H. Mueller, *Mathematics:* Dennis A. Hejhal, John W. Morgan

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CORNELL UNIVERSITY
Biophysical Chemistry: Aaron Lewis.
Physics: Tung-Mow Yan
 GEORGIA INSTITUTE OF TECHNOLOGY
Physics: Ronald F. Fox
 HARVARD UNIVERSITY
Physics: Thomas W. Appelquist, Konrad Osterwalder, Helen R. Quinn
 UNIVERSITY OF ILLINOIS
Astrophysics: Frederick K. Lamb, William D. Watson. *Chemistry:* John A. Katzenellenbogen. *Mathematics:* Karen K. Uhlenbeck
 INSTITUTE FOR ADVANCED STUDY
Astrophysics: Remo J. Ruffini
 IOWA STATE UNIVERSITY
Chemistry: Edward S. Yeung, Gerald J. Small
 JOHNS HOPKINS UNIVERSITY
Chemistry: Aaron N. Bloch
 UNIVERSITY OF KENTUCKY
Mathematics: Kenneth K. Kubota
 UNIVERSITY OF MARYLAND
Physics: Robert H. Gowdy
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Astronomy: Saul A. Rappaport. *Chemistry:* Richard J. Lagow, Mark S. Wrighton. *Neurochemistry:* John D. Fernstrom. *Physics:* Bruce R. Patton, Charles B. Thorn
 MICHIGAN STATE UNIVERSITY
Chemistry: Robert H. Grubbs
 UNIVERSITY OF MICHIGAN
Mathematics: Hugh L. Montgomery
 NATIONAL INSTITUTES OF HEALTH
Neurochemistry: Ronald W. Holz, David S. Forman

NEW YORK UNIVERSITY
Applied Mathematics: George C. Papanicolaou

NORTHEASTERN UNIVERSITY
Chemistry: Arthur M. Halpern

NORTHWESTERN UNIVERSITY
Chemistry: Kenneth G. Spears, Tobin J. Marks, Richard P. Van Duyne

UNIVERSITY OF PENNSYLVANIA
Biochemistry: Barry S. Cooperman

UNIVERSITY OF PITTSBURGH
Chemistry: Paul A. Grieco

PRINCETON UNIVERSITY
Astrophysics: William H. Press. *Mathematics:* William P. Thurston

PURDUE UNIVERSITY
Chemistry: Nicholas Winograd

RUIGERS UNIVERSITY
Chemistry: Martha A. Cotter. *Mathematics:* Michael E. O'Nan

UNIVERSITY OF SOUTHERN CALIFORNIA
Chemistry: Robert Bau

STANFORD UNIVERSITY
Physics: Robert L. Byer, Thomas W. Donnelly. *Mathematics:* Shing-Tung Yau. *Neurophysiology:* Huda Aki

UNIVERSITY OF TEXAS AT AUSTIN
Physics: Frederick L. Hinton

VANDERBILT UNIVERSITY
Chemistry: Larry R. Dalton

UNIVERSITY OF WASHINGTON
Physics: Joseph H. Weis

UNIVERSITY OF WATERLOO
Chemistry: Robert J. LeRoy, Jiri Cizek

WAYNE STATE UNIVERSITY
Chemistry: A. Paul Schaap

UNIVERSITY OF WISCONSIN
Chemistry: Phillip R. Certain. *Mathematics:* K. Jon Barwise

YORK UNIVERSITY
Chemistry: Diethard K. Bohme

The Foundation's only direct support of medical research is its contribution to the operating expenses of the Sloan-Kettering Institute for Cancer Research. For 1974 this contribution amounted to \$600,000, including \$400,000 from a prior commitment, less than 4 per cent of the Institute's expenditures. The Institute, established with Foundation support in 1945, has recently been reorganized into eight major interdisciplinary areas of research, taking a variety of approaches to the problems of cancer.

During 1974 the Foundation also responded to a special need presented by the Institute's parent organization, Memorial Sloan-Kettering Cancer Center, which is engaged in a \$110 million modernization and construction program. Included in the Center's plans are new research facilities costing \$23 million. Toward this goal the Foundation's Trustees, in an exception to a policy which generally precludes support of construction projects, approved a grant of \$2.5 million to the Center.

The University of Rochester has been considering for several years how to make greater use of the computer in research and education in its various colleges and schools. The decision was to create a new inter-college Department of Computer Science reporting directly to the president of the University, and working closely with all other departments and programs to enhance the value of computer-based research and education to them. At the same time the new department will pursue its own research program in computer science, with emphasis on very high-level languages, artificial intelligence, and the mathematical theory of computation.

With the Department of Computer Science established on a small

New Emphasis
 on Computers
 at Rochester

scale, Rochester began to look for ways to accelerate its development to the point where it would have a real impact on the rest of the University, a process that might have taken many years without outside assistance. The Foundation agreed to provide \$400,000 over the first four years to help support additional faculty and graduate students, with a small amount included for purchase of equipment. The University expects that by the end of four years the department will have reached its optimum size and the necessary permanent faculty and associated programs of research and education can then be supported by the regular instructional budget.

The Society for Industrial and Applied Mathematics (SIAM) has a SIAM Institute for Mathematics and Society (SIMS) which operates a program in which an applied mathematician works for two years as part of an interdisciplinary team studying a particular social or environmental problem. It is expected that through this "Transplant Program" the mathematician will develop a professional specialty in the area of study. For its third such "transplant" SIMS selected Dr. Alice Whittemore, associate professor of mathematics at Hunter College of the City University of New York. With Sloan support of \$58,000 over two years, she is working with a group at the New York University Institute of Environmental Medicine on the problem of environmental carcinogens. Her function is the development of mathematical models and theory relating to the tolerance limits for population exposure to cancer-causing substances, and the application of statistics and probability theory to the mathematical uncertainties involved.

At the University of Michigan a 1.3-meter reflecting telescope, capable of being used for research at the frontiers of astronomy, is being underutilized because of poor viewing conditions—cloudy skies, atmospheric turbulence, and the increasingly bright lighting of the Ann Arbor area. Three universities—Michigan, Dartmouth College, and Massachusetts Institute of Technology—have formed a consortium to move the instrument to Kitt Peak National Observatory in Arizona, where viewing conditions are excellent. There, their faculty and students will use the telescope for, among other purposes, optical observations of X-ray-emitting objects detected by an MIT Small Astronomy Satellite to be launched in the Spring of 1975.

The Sloan Foundation agreed to contribute \$100,000 to the relocation of the Michigan telescope, subject to the three institutions' raising the remaining \$200,000 needed for the move.

In the Southeast as well, universities are joining together to share the use of expensive and highly specialized facilities which in many cases are not fully utilized. The Southern Regional Education Board has identified hundreds of such facilities in 14 states and has published a listing of them

Mathematics
 in the Service
 of Society

Enhancing
 Efficiency
 in Astronomy

**Sharing
Facilities
in the South**

in its *Catalog of Uncommon Facilities in Southern Universities*. For example, one institution has a seismograph observatory which is part of a worldwide network; another has a mass spectrometry laboratory of unusual capabilities; still another houses an experimental stress analysis laboratory equipped for study of the relationship between scattered-light photoelasticity and holography, one of the few of its kind in the nation.

Universities possessing such facilities are happy to have them utilized by visiting faculty members and advanced graduate students; and in many instances faculty and students need to use equipment not available on their own campuses. What is needed is a mechanism through which such visits can be encouraged and arranged, and a means of covering the additional expenses incurred in spending periods away from the home campus. The Southern Regional Education Board will undertake this function with the help of a two-year, \$110,000 Sloan grant. It will evaluate applications from graduate students wishing to use expensive facilities to attain their educational objectives, and from faculty members seeking to advance their own research and teaching capabilities. It will make small grants to enable approved applicants to travel to the site of the needed equipment. If this experimental program proves successful, it is hoped that state governments will make it a part of their regular budgets for higher education.

**Science
and Society
at Vassar**

The place of science and technology in a liberal arts curriculum has been under study for several years at Vassar College, and the result is a new program called Science, Technology, and Society. The program, building upon existing strength in the social sciences and humanities, is involving an increasing number of natural scientists in constructing a multidisciplinary approach to science within a liberal arts context. Two new colloquia have been established, one a primarily theoretical and philosophical inquiry into the nature of a technological society, the other with a more practical focus on urban studies and human ecology. Additionally, a field work and internship program will take students into the surrounding community for first-hand experience with the complexities of operating governmental and other agencies.

Vassar needs to develop collateral science courses to undergird the new multidisciplinary program, and primarily for this purpose the Foundation granted \$112,000. If, after a two-year trial period, the faculty decides to adopt the program as a permanent offering, Vassar expects to be able to support it out of its own funds.

An important effort to train superior teachers of science is under way at the University of California, Berkeley, where a Group in Science and Mathematics Education is working to place science teaching at the same level of excellence as the science that is being taught. The group, known by its acronym SESAME (Search for Excellence in Science and Mathe-

**Improving
the Teaching
of Science**

matics Education), is an interdepartmental unit involving faculty from many science departments. It conducts research in the educational process, offers some courses, and awards a Ph.D. in science and mathematics education. It also serves as a laboratory to which other science faculty members can go for help in improving their teaching.

The Berkeley group, directed by Dr. Frederick Reif, professor of physics, has maintained a high intellectual level in its research and in the doctoral candidates it accepts, and has achieved a national reputation in its field. Lacking a full-time faculty or staff, however, it has not been able to advance its innovations as rapidly as would be desirable. The University feels that the first step in expanding the group and placing it on a permanent footing should be the appointment of some younger scientists to work full time in its field. Accordingly, the Foundation agreed to support two full-time positions for three years at the level of research associate (equivalent to assistant professor). A three-year grant of \$115,000 was made for this purpose.

These other grants for research and education in science and technology were approved in 1974:

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D.C.:	
For partial support of one AAAS Congressional Fellow to work in the Office of Technology Assessment	\$ 8,500
For special activities associated with the AAAS annual meeting, held in New York in January of 1975	\$ 7,500
UNIVERSITY OF CHICAGO, Chicago, Ill.: For development of a sensitive detection system for far infrared astronomy	\$17,000
EDUCATIONAL FOUNDATION FOR NUCLEAR SCIENCE, Chicago, Ill.: For partial support of a circulation-promotion effort for <i>The Bulletin of the Atomic Scientists</i>	\$13,000
THE FRANKLIN INSTITUTE, Philadelphia, Pa.: To assist with publication costs of the proceedings of the first Franklin Conference, held in October of 1974	\$ 4,250
HARVARD UNIVERSITY, Cambridge, Mass.: For planning and experimenting in the development of an office of health information at the Harvard School of Public Health	\$20,000
IOWA STATE UNIVERSITY, Ames, Iowa: To support a study intended to lead to improved undergraduate education in the history of science, to be undertaken by the History of Science Society	\$13,250
NATIONAL ACADEMY OF SCIENCES, Washington, D.C.: In support of the Joint National Academy of Sciences-Brazilian National Research Council Program of Graduate Research and Teaching in Chemistry	\$15,000
UNIVERSITY OF NEVADA, Reno, Nev.: For development of an introductory physics course for non-science students	\$20,000

NORTHWESTERN UNIVERSITY, Evanston, Ill.: For an evaluation of the Freshman Integrated Study Program of the University's Technological Institute	\$20,000
PALACE OF ARTS AND SCIENCE FOUNDATION, San Francisco, Calif.: In support of development by the Exploratorium of exhibit catalogs for the public, for teachers and for other museums	\$20,000
STANFORD UNIVERSITY, Stanford, Calif.: For interim support of Stanford's Values, Technology, and Society Program	\$19,470
UNIVERSITY OF WASHINGTON, Seattle, Wash.: For partial support of a Summer Institute for Theoretical Physics, to be held in 1975	\$12,000
WESLEYAN UNIVERSITY, Middletown, Conn.: In support of Ph.D. candidates in the Mathematics Department	\$20,000
UNIVERSITY OF WISCONSIN, Milwaukee, Wis.: To support participation by engineering faculty in a 1974 summer workshop of the University's Cultural and Technological Studies Program	\$20,000

Related Problems of Society



IN addition to its activities in specific areas of interest, described in preceding sections of this report, the Foundation honors an occasional request in more general areas. Such grants often are made for studies and experiments in the processes of higher education, in which the Foundation maintains a continuing interest; others are exploratory and "seed" grants which may in time lead to new Foundation programs. Still others are categorized as "civic" grants, made in recognition of the Foundation's obligations as a corporate citizen of the Greater New York area.

The following grants were made for the above purposes in 1974:

ADMINISTRATION AND MANAGEMENT RESEARCH ASSOCIATION OF NEW YORK CITY, INC.: In partial support of a Metropolitan Energy Conference planned by the Department of City Planning	\$ 6,000
AMERICAN COUNCIL FOR EMIGRES IN THE PROFESSIONS, INC., New York, N.Y.: In partial support of the Council's program on behalf of Russian scientists, engineers and economists	\$10,000
ASSOCIATED COUNCILS OF THE ARTS, New York, N.Y.: In support of a management analysis of Associated Councils of the Arts	\$17,800
ASSOCIATION OF BLACK FOUNDATION EXECUTIVES, INC., New York, N.Y.: In support of a publications series of occasional reports and critiques of foundation policies and programs	\$10,000
41 COLLEGE ENTRANCE EXAMINATION BOARD, New York, N.Y.: In partial support of a Task Force on Student Aid Problems	\$20,000

COMMISSION ON PRIVATE PHILANTHROPY AND PUBLIC NEEDS, Washington, D.C.: For general support	\$20,000
COUNCIL ON FOUNDATIONS, New York, N.Y.: For general support . . .	\$10,000
GOODWILL INDUSTRIES OF AMERICA, INC., Washington, D.C.: In partial support of the implementation and installation of a standard accounting system among fifty small Goodwill Industries	\$10,000
THE GRADUATE SCHOOL AND UNIVERSITY CENTER OF THE CITY UNIVERSITY OF NEW YORK: In support of expenses incurred in bringing outside expertise into the service of the Task Force on Higher Education in New York State	\$15,000
GROSSMONT COLLEGE, El Cajon, Calif.: For the preparation of community college financial aid materials	\$12,685
HARVARD UNIVERSITY, Cambridge, Mass.: In support of a Conference on Undergraduate Education to be held in February 1975	\$ 4,000
JOBS FOR YOUTH, INC., New York, N.Y.: In partial support of a Job Development Program	\$10,000
LINFIELD COLLEGE, McMinnville, Oregon: For evaluation of the initial year of the "Linfield Plan" for increasing productivity in higher education	\$ 7,500
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.: For partial support of a study of a new program for the analysis of arms control and defense policies	\$20,000
REGIONAL PLAN ASSOCIATION, INC., New York, N.Y.: For partial support of an evaluation of the Tri-State Regional Planning Commission	\$10,000
URBAN PERIODICALS, INC., New York, N.Y.: In support of a campaign to expand circulation of the quarterly <i>New York Affairs</i>	\$15,000
NATIONAL BOARD OF THE YWCA OF U.S.A., New York, N.Y.: In partial support of the YWCA Executive Management Development Project	\$10,000

Policies and Procedures



THE Alfred P. Sloan Foundation was established in 1934 as a general-purpose philanthropic foundation by Alfred P. Sloan, Jr., for many years the chief executive officer of General Motors Corporation. Mr. Sloan was active in the Foundation's affairs until his death in 1966.

The basic interests of the Foundation are in science and technology, economics and management, and in education and the problems of society related to those interests. From these interests have arisen the Foundation's Particular Programs, currently focusing on the uses of technology in education; on neuroscience, the study of the brain and its relationship to behavior; and on minority engineering education.

Excluded from the Foundation's interests are the creative and performing arts; religion, the humanities, and medical research except for that conducted at the Sloan-Kettering Institute for Cancer Research. International projects are not supported, with rare exceptions, and the Foundation does not normally make grants for endowment, general support, or buildings, or for equipment not part of a Foundation-supported program. No grants are made directly to individuals.

Proposals falling within the above guidelines may be submitted at any time, usually to the President of the Foundation. A letter of application should state: (1) the specific nature of the proposed activity or study; (2) the procedure to be employed; (3) the name and qualifications of the

person or persons to be responsible for the project, and (4) the expected cost and duration of the project. Often a preliminary letter of inquiry will be useful in determining whether a formal proposal would be warranted.

A grant application should be accompanied by documents indicating the applicant's tax-exempt status and its classification as either a private foundation or a publicly supported organization.

The Foundation is governed by an 18-member Board of Trustees assisted by a professional staff. Final disposition of all proposals is the responsibility of members of the Board.

Financial Review

Financial Review



THE financial statements of the Foundation, which have been audited by Haskins & Sells, independent certified public accountants, appear on pages 49 to 63. They include the balance sheet, the statement of income and funds, the statement of changes in financial position, the schedule of administration and investment expenses, the schedule of marketable securities, and the summary and schedule of grants and appropriations.

Investment and other income in 1974 amounted to \$12,028,197, compared with \$14,012,864 in 1973. The decrease of \$1,984,667 reflected lower dividend income in 1974. Investment expenses in 1974 totalled \$316,340, of which \$270,270 represented investment counsel fees. Provision for Federal excise tax amounted to \$466,000 in 1974. These deductions from income totalled \$782,340 in 1974, compared with \$862,982 in 1973.

Net investment income was \$11,245,857 in 1974, compared with net investment income of \$13,149,882 in 1973.

The total of grants and appropriations authorized and administration expenses during 1974 amounted to \$16,077,556, or \$4,831,699 in excess of net investment income of \$11,245,857. Grants and appropriations totalled \$14,976,496 while administration expenses amounted to \$1,101,060. Over the Foundation's forty year history, the cumulative excess of grants and expenses over income has amounted to \$53,693,136.

The total of grant and appropriation payments in 1974 was \$13,397,895, compared with \$14,135,492 in 1973. Together with 1974 administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures in 1974 was \$15,361,383, compared with \$16,031,758 in 1973.

A summary of the Foundation's marketable securities at ledger and quoted market value at December 31, 1974 appears on page 53. The market value of these investment assets of \$202,159,112 at December 31, 1974 compared with \$283,783,324 at December 31, 1973.

A summary of grants by major classifications followed by a listing of grants made during 1974 will be found on pages 58 to 63. Grants and

appropriations authorized and payments during the year ended December 31, 1974 are summarized in the following table:

Grants and appropriations authorized but not due at January 1, 1974	\$14,999,693
Authorized during 1974	<u>14,976,496</u>
	29,976,189
Payments during 1974	<u>13,397,895</u>
Grants and appropriations authorized but not due at December 31, 1974	<u>\$16,578,294</u>

The Foundation has a contributory retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund which provides for purchase of annuities for employees. Retirement plan expense was \$84,739 and \$87,435 for 1974 and 1973, respectively.

The Internal Revenue Code, as amended by the Tax Reform Act of 1969, imposes an excise tax at the rate of 4% on the net investment income of private foundations. The accompanying financial statements include provision for this tax. No Federal excise tax has been allocated to net gain on disposals of securities added to the principal fund, since the basis for determining gain or loss on disposals of securities under the Act resulted in a net loss for excise tax purposes.

Income from investments credited to the General Motors Dealers Appreciation Fund during 1974, after provision for Federal excise tax, amounted to \$249,429. A grant of \$200,000 to the Sloan-Kettering Institute for Cancer Research was authorized and applied against this Fund, as set forth on page 36. Grant payments from this Fund during the year 1974 amounted to \$600,000, resulting in grants outstanding and unpaid at the end of 1974 of \$1,600,000.

The net worth of the Foundation at December 31, 1974, based on quoted market values, was divided as follows:

	TOTAL ASSETS AT MARKET VALUE	GRANTS AND APPROPRIATIONS AUTHORIZED BUT NOT DUE FOR PAYMENT	ACCRUED FEDERAL EXCISE TAX	FUND BALANCES AT MARKET VALUE
General Fund	\$198,238,070	\$14,978,294	\$458,486	\$182,801,290
General Motors Dealers Appreciation Fund	4,240,601	1,600,000	10,146	2,630,455
Total	<u>\$202,478,671</u>	<u>\$16,578,294</u>	<u>\$468,632</u>	<u>\$185,431,745</u>

HASKINS & SELLS

CERTIFIED PUBLIC ACCOUNTANTS

TWO BROADWAY
NEW YORK, NEW YORK 10004AUDITORS' OPINION

Alfred P. Sloan Foundation:

We have examined the balance sheet of Alfred P. Sloan Foundation as of December 31, 1974 and 1973 and the related statements of income and funds and of changes in financial position for the years then ended. Our examination also comprehended the supplemental schedule of administration and investment expenses for the two years ended December 31, 1974 and the supplemental schedules of marketable securities at December 31, 1974 and grants and appropriations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements and supplemental schedules present fairly the financial position of the Foundation at December 31, 1974 and 1973 and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



February 3, 1975

Balance Sheet

December 31, 1974 and 1973

	<u>1974</u>	<u>1973</u>
<u>ASSETS</u>		
MARKETABLE SECURITIES:		
Fixed income securities:		
U.S. Government and agency obligations	\$ 30,022,045	\$ 38,169,364
Other	31,368,830	19,675,980
Total fixed income securities	<u>61,390,875</u>	<u>57,845,344</u>
Common stocks:		
General Motors Corporation	47,865,564	47,865,564
Other common stocks	100,347,292	105,541,337
Total common stocks	<u>148,212,856</u>	<u>153,406,901</u>
Total marketable securities (quoted market: 1974—\$202,159,112; 1973—\$283,783,324)	209,603,731	211,252,245
CASH	319,559	544,924
TOTAL	<u>\$209,923,290</u>	<u>\$211,797,169</u>

OBLIGATIONS AND FUNDS

GRANTS AND APPROPRIATIONS AUTHORIZED BUT NOT DUE FOR PAYMENT	\$ 16,578,294	\$ 14,999,693
ACCRUED FEDERAL EXCISE TAX	468,632	548,720
FUND BALANCES	192,876,364	196,248,756
TOTAL	<u>\$209,923,290</u>	<u>\$211,797,169</u>

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:

The Foundation maintains its accounts on a modified cash basis, which in effect is not materially different from the accrual basis of accounting.

Marketable securities purchased are carried at cost; those received by gift or bequest are carried at quoted market value at date of gift or bequest. Gain or loss on disposal of securities is determined generally on the basis of first-in, first-out cost, but in certain instances the identified certificate basis is used. Net gain or loss on disposals is applied to the principal fund.

Dividend and interest income, and investment expense are recorded on a cash basis. The unrecorded amount of interest and dividends receivable is not material in relation to net assets or fund balances.

Grant appropriations are accrued at the time authorized by the Trustees and the Federal excise tax is accrued in the year to which it relates. There were no significant unpaid administration expenses at either year-end.

Statement of Income and Funds

For the years ended December 31, 1974 and 1973

INCOME:	<u>1974</u>	<u>1973</u>
Investment income:		
Dividends	\$ 8,151,880	\$ 10,532,075
Interest	3,837,115	3,455,964
Other	39,202	24,825
	<u>12,028,197</u>	<u>14,012,864</u>
Less:		
Investment expenses	316,340	316,982
Provision for Federal excise tax	466,000	546,000
	<u>782,340</u>	<u>862,982</u>
Net investment income	<u>11,245,857</u>	<u>13,149,882</u>
Grants and expenses:		
Grants and appropriations authorized	14,976,496	14,255,369
Administration expenses	1,101,060	1,049,964
Total	<u>16,077,556</u>	<u>15,305,333</u>
Excess of grants and expenses over income for the year	(4,831,699)	(2,155,451)
Cumulative excess of grants and expenses over income from inception to:		
Beginning of year	<u>(48,861,437)</u>	<u>(46,705,986)</u>
End of year	<u>(53,693,136)</u>	<u>(48,861,437)</u>
PRINCIPAL:		
Balance at beginning of year	245,110,193	240,474,441
Assets received under will and as remainderman of trust	3,107	27,873
Net gain on disposals of securities	1,456,200	4,607,879
Balance at end of year	<u>246,569,500</u>	<u>245,110,193</u>
FUND BALANCES AT END OF YEAR	<u>\$192,876,364</u>	<u>\$196,248,756</u>

See Summary of Significant Accounting Policies on Page 49.

Statement of Changes in Financial Position

For the years ended December 31, 1974 and 1973

SOURCE OF FUNDS:	<u>1974</u>	<u>1973</u>
Investment and other income	\$12,028,197	\$14,012,864
Assets received under will and as remainderman of trust	3,107	27,873
Net gain on disposals of securities	<u>1,456,200</u>	<u>4,607,879</u>
	<u>13,487,504</u>	<u>18,648,616</u>
APPLICATION OF FUNDS:		
Grant and appropriation payments	13,397,895	14,135,492
Administration expenses	1,101,060	1,049,964
Investment expenses	316,340	316,982
Federal excise taxes paid	546,088	529,320
	<u>15,361,383</u>	<u>16,031,758</u>
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Change in ledger value of investments	(1,648,514)	2,405,789
Change in cash balances	(225,365)	211,069
NET CHANGE IN FUNDS	<u>\$(1,873,879)</u>	<u>\$ 2,616,858</u>

See Summary of Significant Accounting Policies on Page 49.

Schedule of Administration and Investment Expenses

For the years ended December 31, 1974 and 1973

	<u>1974</u>	<u>1973</u>
ADMINISTRATION EXPENSES:		
Salaries and employee benefits:		
Salaries	\$ 540,046	\$ 529,044
Employees' retirement plan and other benefits	138,189	140,108
	<u>678,235</u>	<u>669,152</u>
Rent*	202,870	184,567
Program expenses	116,218	114,649
Office expenses and services	86,855	75,407
Reports and publications	38,587	23,810
Auditing and legal	24,365	27,896
Total administration expenses	1,147,130	1,095,481
Less: Allocation of administration expenses applicable to investments	46,070	45,517
Balance of administration expenses applicable to grant making	<u>\$1,101,060</u>	<u>\$1,049,964</u>
INVESTMENT EXPENSES:		
Investment counsel fees	\$ 270,270	\$ 271,465
Allocation of administration expenses applicable to investments	46,070	45,517
Total investment expenses	<u>\$ 316,340</u>	<u>\$ 316,982</u>

*The Foundation occupies office facilities under a lease which expires April 30, 1985 and provides for annual rental payments, including real estate taxes, of approximately \$210,000 for 1975 and subsequent years.

Schedule of Marketable Securities

December 31, 1974

	<u>LEDGER AMOUNT</u>	<u>QUOTED MARKET VALUE AMOUNT</u>	<u>PERCENT OF TOTAL INVESTMENT</u>
SUMMARY			
Fixed income securities:			
U.S. Government and agency obligations	\$ 30,022,045	\$ 29,108,985	14.4%
Other	31,368,830	29,996,873	14.8
Total fixed income securities	<u>61,390,875</u>	<u>59,105,858</u>	<u>29.2</u>
Common stocks:			
General Motors Corporation	47,865,564	38,150,480	18.9
Other common stocks	100,347,292	104,902,774	51.9
Total common stocks	<u>148,212,856</u>	<u>143,053,254</u>	<u>70.8</u>
Total marketable securities	<u>\$209,603,731</u>	<u>\$202,159,112</u>	<u>100.0%</u>
FIXED INCOME SECURITIES			
U.S. Government and Agency Obligations:			
Treasury Notes:			
6% —May 15, 1975	\$ 2,000,000	\$ 2,003,750	\$ 1,988,740
6.50% —May 15, 1976	2,000,000	1,997,945	1,979,360
6.25% —February 15, 1978	2,500,000	2,509,766	2,427,325
Federal Home Loan Banks			
Consolidated Bonds:			
7.95% —August 25, 1975	680,000	679,788	679,572
7.20% —May 25, 1976	1,000,000	1,002,031	988,750
7.75% —February 25, 1980	1,300,000	1,301,219	1,298,375
Twelve Federal Land Banks			
Consolidated Bonds:			
5.70% —July 21, 1975	2,055,000	2,008,763	2,024,175
7.05% —July 20, 1976	2,700,000	2,615,344	2,662,875
7.50% —July 20, 1977	1,090,000	1,107,599	1,083,188
5.125% —April 20, 1978	500,000	416,250	462,500
7.15% —July 23, 1979	2,000,000	1,978,864	1,952,500
7.30% —October 20, 1982	1,000,000	1,007,500	975,000

Schedule of Marketable Securities

December 31, 1974

(continued)

	PRINCIPAL AMOUNT	LEDGER AMOUNT	QUOTED MARKET VALUE
FIXED INCOME SECURITIES			
Federal National Mortgage Association Debentures:			
5.20%—January 19, 1977	\$ 3,000,000	\$ 3,011,250	\$ 2,820,000
7.05%—March 10, 1981	1,100,000	1,034,000	1,058,750
7.25%—June 10, 1981	300,000	297,656	291,750
6.65%—June 10, 1982	1,000,000	1,002,500	935,000
6.05%—February 1, 1988	1,000,000	996,250	840,000
7% —March 10, 1992	5,350,000	5,051,570	4,641,125
Total U.S. Government and agency obligations		<u>30,022,045</u>	<u>29,108,985</u>
Other:			
Undivided interest in demand notes:			
Atlantic Richfield Company	393,000	393,000	393,000
General Electric Company	1,139,000	1,139,000	1,139,000
Certificates of deposit:			
Bank of America N.T. & S.A.:			
9.55%—January 21, 1975	200,000	200,000	199,984
9.30%—January 27, 1975	1,331,000	1,331,000	1,330,614
Chase Manhattan Bank, N.A.:			
9.00%—January 27, 1975	1,861,000	1,861,000	1,860,125
Chemical Bank:			
9.30%—February 21, 1975	400,000	400,000	399,844
8.75%—April 23, 1975	400,000	400,000	399,552
Continental Illinois National Bank and Trust Company of Chicago:			
9.30%—January 27, 1975	2,000,000	2,000,000	1,999,340
9.55%—January 27, 1975	889,000	889,000	888,849
First National City Bank:			
9.55%—January 27, 1975	3,000,000	3,000,000	2,999,700
Manufacturers Hanover Trust Company:			
9.00%—January 27, 1975	3,000,000	3,000,000	2,998,590

Schedule of Marketable Securities

December 31, 1974

(continued)

	PRINCIPAL AMOUNT	LEDGER AMOUNT	QUOTED MARKET VALUE
FIXED INCOME SECURITIES			
General Motors Acceptance Corporation Debentures:			
3.625%—September 1, 1975	\$ 1,000,000	\$ 810,600	\$ 966,250
5% —September 1, 1980	1,300,000	1,300,000	1,066,000
5% —March 15, 1981	1,500,000	1,492,500	1,231,875
National Dairy Products Corporation Debentures:			
3.125%—June 1, 1976	200,000	158,664	184,250
Household Finance Corporation Sinking Fund Debentures:			
4.625%—January 15, 1977	1,015,000	870,118	923,650
Morgan Guaranty Trust Company of New York Capital Notes:			
6.375%—April 1, 1978	1,000,000	1,000,000	932,500
Bankers Trust New York Corporation Debentures:			
6.375%—September 1, 1978	1,000,000	997,500	926,250
General Electric Credit Corporation Notes:			
7% —February 15, 1979	2,000,000	1,995,000	1,782,500
American Telephone and Telegraph Company Debentures:			
4.375%—April 1, 1985	1,500,000	1,518,210	1,095,000
8.75% —May 15, 2000	2,500,000	2,502,188	2,456,250
Aluminium Company of Canada, Limited Sinking Fund Debentures:			
9.50% —March 1, 1995	1,000,000	1,012,500	940,000
International Paper Company Sinking Fund Debentures:			
8.85% —March 15, 1995	1,500,000	1,553,750	1,458,750
Dow Chemical Company Debentures:			
8.875%—May 1, 2000	1,500,000	1,544,800	1,425,000
Total other		<u>31,368,830</u>	<u>29,996,873</u>
Total fixed income securities		<u>\$61,390,875</u>	<u>\$59,105,858</u>

Schedule of Marketable Securities

December 31, 1974

(continued)

COMMON STOCKS	NUMBER OF SHARES	LEDGER AMOUNT	QUOTED MARKET VALUE
Alcon Laboratories, Inc.	51,000	\$ 1,811,451	\$ 777,750
American Home Products Corporation	60,000	2,164,861	1,995,000
American Telephone and Telegraph Company	30,000	1,595,517	1,338,750
BankAmerica Corporation	36,100	1,633,425	1,150,688
Black and Decker Manufacturing Company	26,460	970,777	555,660
Caterpillar Tractor Co.	50,000	1,489,726	2,425,000
Citicorp	46,000	1,524,025	1,305,250
Coca-Cola Company	27,000	2,165,920	1,431,000
Walt Disney Productions	25,014	766,579	545,355
Dow Chemical Company	30,100	1,630,311	1,655,500
Dun & Bradstreet Companies, Inc.	48,000	1,412,906	924,000
Eastman Kodak Company	94,154	2,452,869	5,919,933
Exxon Corporation	54,167	2,636,955	3,500,542
First Bank System, Inc.	40,000	1,891,325	1,330,000
First Chicago Corporation	72,456	753,105	1,249,866
First International Bancshares, Inc.	43,000	1,625,104	1,505,000
First National Boston Corporation	45,000	851,683	1,108,125
General Electric Company	50,000	2,287,451	1,668,750
General Motors Corporation	1,240,666	47,865,564	38,150,480
General Reinsurance Corporation	9,000	1,893,850	1,557,000
Government Employees Life Insurance Company	53,200	2,238,978	1,396,500
Halliburton Company	15,000	1,317,432	2,056,875
International Business Machines Corporation	83,280	6,008,090	13,991,040
International Flavors & Fragrances Inc.	53,000	1,921,575	1,337,985
Johnson & Johnson	15,000	1,353,475	1,213,125
S. S. Kresge Company	58,000	2,397,230	1,283,250
Eli Lilly and Company	33,000	2,048,917	2,244,000
Louisiana Land and Exploration Company	52,000	2,208,855	1,241,500
Lowe's Companies, Inc.	39,600	2,301,650	1,098,900
Lubrizol Corporation	81,500	3,448,553	3,198,875
MassMutual Mortgage and Realty Investors	80,000	2,014,187	600,000
Merck & Co., Inc.	38,000	439,585	2,522,250

Schedule of Marketable Securities

December 31, 1974

(continued)

COMMON STOCKS	NUMBER OF SHARES	LEDGER AMOUNT	QUOTED MARKET VALUE
Minnesota Mining and Manufacturing Company	24,000	\$ 1,331,058	\$ 1,107,000
Mobil Oil Corporation	77,000	2,211,643	2,772,000
J. P. Morgan & Co. Incorporated	87,272	1,538,206	4,516,326
Northwest Bancorporation	42,000	615,477	1,407,000
Northwestern Mutual Life Mortgage and Realty Investors	86,700	2,037,151	834,488
J. C. Penney Company, Inc.	24,400	1,775,864	875,350
Philip Morris Incorporated	55,000	2,990,861	2,640,000
Polaroid Corporation	30,300	2,932,922	564,338
Procter & Gamble Company	43,000	760,598	3,504,500
Ralston Purina Company	40,000	1,690,521	1,490,000
Schering-Plough Corporation	26,000	1,857,586	1,365,000
Jos. Schlitz Brewing Company	54,000	2,141,719	810,000
Schlumberger Limited	25,600	935,258	2,761,600
Sears, Roebuck and Co.	78,805	1,711,618	3,802,341
Skaggs Companies, Inc.	110,000	2,612,838	1,127,500
Southeast Banking Corporation	44,000	1,139,144	407,000
Squibb Corporation	51,000	2,305,438	1,466,250
Standard Oil Company (Ohio)	49,000	2,904,130	2,940,000
Superior Oil Company	7,000	2,059,711	1,204,000
Texaco Inc.	118,652	1,839,222	2,476,861
Upjohn Company	14,500	1,264,685	734,063
Wachovia Corporation	52,500	1,621,839	649,688
Weyerhaeuser Company	20,000	543,799	547,500
Xerox Corporation	15,000	269,637	772,500
Total common stocks		148,212,856	143,053,254
Total fixed income securities		61,390,875	59,105,858
Total marketable securities		\$209,603,731	\$202,159,112

Summary of Grants and Appropriations

	AUTHORIZED BUT NOT DUE DECEMBER 31, 1973	CHANGES DURING 1974		AUTHORIZED BUT NOT DUE DECEMBER 31, 1974
		AUTHORIZED	PAYMENTS	
Sloan Fellowships for Basic Research (156 fellowships in 64 colleges and universities)	\$ 2,067,145	\$ 1,555,584	\$ 1,430,429	\$ 2,192,300
College Science Program (14 colleges and universities)	509,500	—	478,500	31,000
Major Grants to colleges and universities	8,269,900	8,814,387	8,035,854	9,048,433
Other Major Grants:				
Association for the Integration of Management, Inc.	\$ 50,000	—	\$ 50,000	—
Brookings Institution	200,000	—	150,000	\$ 50,000
Engineers' Council for Professional Development, Inc.	225,000	—	75,000	150,000
Joint Council on Economic Education	115,000	—	61,000	54,000
Lincoln Center for the Performing Arts, Inc.	100,000	—	100,000	—
Memorial Sloan-Kettering Cancer Center	—	\$2,500,000	500,000	2,000,000
NAACP Legal Defense and Educational Fund, Inc.	110,000	—	50,000	60,000
National Academy of Sciences	49,000	75,000	49,000	75,000
National Bureau of Economic Research, Inc.	214,386	—	214,386	—
National Medical Fellowships, Inc.	—	850,000	550,000	300,000
Neurosciences Research Foundation, Incorporated	100,000	—	50,000	50,000
Sloan-Kettering Institute for Cancer Research	2,000,000	200,000	600,000	1,600,000
Southern Regional Education Board	—	110,000	55,000	55,000
Woodrow Wilson National Fellowship Foundation	35,000	—	35,000	—
TOTAL OTHER MAJOR GRANTS	3,198,386	3,735,000	2,539,386	4,394,000
Staff Grant appropriation for grants in ensuing year	750,000	749,555	749,555	750,000
Other Grants and Appropriations (none over \$100,000 in 1974)	204,762	121,970	164,171	162,561
TOTAL GRANTS AND APPROPRIATIONS	<u>\$14,999,693</u>	<u>\$14,976,496</u>	<u>\$13,397,895</u>	<u>\$16,578,294</u>

Schedule of Grants and Appropriations

	AUTHORIZED BUT NOT DUE DEC. 31, 1973	CHANGES DURING 1974		AUTHORIZED BUT NOT DUE DEC. 31, 1974
		AUTHORIZED	PAYMENTS	
A&T University Foundation, Inc.	\$ 100,000		\$ 50,000	\$ 50,000
Adelphi University	92,000		46,000	46,000
Administration and Management Research Association of New York City, Inc.		\$ 6,000	6,000	
American Association for the Advancement of Science		16,000	16,000	
American Council for Emigres in the Professions, Inc.		10,000	10,000	
American Economic Association		20,000	20,000	
American Enterprise Institute for Public Policy Research		19,700	19,700	
Amherst College	75,000		75,000	
Arizona, University of		25,154	15,679	9,475
Arizona State University	8,050		8,050	
Associated Councils of the Arts Association for the Integration of Management, Inc.		17,800	17,800	
Association of Black Foundation Executives, Inc.	50,000		50,000	
Barnard College		10,000	10,000	
Beloit College	74,800	26,220	12,650	13,570
Boston University		19,600	50,000	24,800
Brandeis University	16,100		19,600	
British Columbia, University of	11,500		16,100	
Brookings Institution	200,000		11,500	
Brown University	23,790	20,000	150,000	50,000
California, University of	779,107	949,236	43,790	997,670
California Institute of Technology	274,650	643,420	730,673	514,935
Carleton College	42,500		403,135	
Carnegie-Mellon University	120,000		42,500	
Case Western Reserve University	17,618	213,560	120,000	188,855
Chicago, University of	30,705	71,050	42,323	25,300
City University of New York, The Graduate School and University Center		15,000	76,455	
Claremont University Center		59,000	15,000	
Clark University	27,500		59,000	
Clarkson College of Technology		10,000	27,500	
Colgate University	37,500		10,000	
College Entrance Examination Board		20,000	37,500	
Colorado, University of	7,130	20,403	20,000	4,600
Colorado State University		15,000	22,933	
Columbia University	21,275	545,885	15,000	264,725
Commission on Private Philanthropy and Public Needs		20,000	302,435	
Connecticut Foundation, The University of Consortium for Graduate Study in Management		35,000	20,000	
Cornell College	20,000	300,000	150,000	150,000
Cornell University	322,609	34,960	20,000	257,480

	AUTHORIZED BUT NOT DUE DEC. 31, 1973	CHANGES DURING 1974		AUTHORIZED BUT NOT DUE DEC. 31, 1974
		AUTHORIZED	PAYMENTS	
Council on Foundations, Inc.	\$ 20,000	\$ 10,000	\$ 30,000	\$ 250,000
Dartmouth College	600,000		350,000	25,000
Detroit Institute of Technology	80,000		55,000	
Duke University	4,715		4,715	
Education Development Center, Inc.		20,000	20,000	
Educational Foundation for Nuclear Science, Inc.		13,000	13,000	
Engineers' Council for Professional Development, Inc.	225,000		75,000	150,000
Fashion Institute of Technology		20,000	20,000	
Florida, University of		19,000	19,000	
Florida Agricultural and Mechanical University	90,000		90,000	
Foundation Center	40,000		40,000	
Foundation for Advanced Education in the Sciences, Inc.		35,150	33,150	2,000
Franklin Institute		4,250	4,250	
George Washington University		180,000		180,000
Georgetown University	35,000		35,000	
Georgia Institute of Technology	150,000	20,700	160,350	10,350
Goodwill Industries of America, Inc.		10,000	10,000	
Grinnell College	35,000		35,000	
Grossmont College		12,685	12,685	
Harvard University	294,805	1,151,200	704,872	741,133
Harvey Mudd College	55,000		55,000	
Haverford College	40,000		40,000	
Howard University		415,000	155,000	260,000
Illinois, University of	75,875	77,228	119,178	33,925
Institute for Advanced Study		18,400	9,200	9,200
Iowa State University	9,200	43,140	47,070	5,270
Jobs for Youth, Inc.		10,000	10,000	
Johns Hopkins University	10,350	19,594	24,884	5,060
Joint Council on Economic Education	115,000		61,000	54,000
Kentucky, University of	5,290	18,400	14,490	9,200
Knox College	27,500	6,275	33,775	
Lafayette College	101,300		51,300	50,000
Lincoln Center for the Performing Arts, Inc.	100,000		100,000	
Linfield College		7,500	7,500	
Maine, University of	45,000		45,000	
Maryland, University of	16,560	18,515	24,380	10,695
Massachusetts, University of	300,000	14,300	114,300	200,000
Massachusetts Institute of Technology	955,890	749,575	638,765	1,066,700
Memorial Sloan-Kettering Cancer Center		2,500,000	500,000	2,000,000
Michigan, University of	8,050	111,150	10,000	109,200
Michigan State University	15,950	365,050	144,375	236,625
Middlebury College	40,000	5,000	45,000	
Minnesota, University of	208,860		208,860	
Mount Holyoke College	35,000		35,000	

Schedule of Grand Appropriations

(continued)

	AUTHORIZED	CHANGES DURING 1974		AUTHORIZED
	BUT NOT DUE DEC. 31, 1973	AUTHORIZED	PAYMENTS	BUT NOT DUE DEC. 31, 1974
NAACP Legal Defense and Educational Fund, Inc.	\$ 110,000		\$ 50,000	\$ 60,000
NAACP Special Contribution Fund	50,000		25,000	25,000
National Academy of Sciences	49,000	\$ 90,000	64,000	75,000
National Board of the Young Women's Christian Association of the U.S.A.		10,000	10,000	
National Bureau of Economic Research, Inc.	214,386		214,386	
National Medical Fellowships, Inc.		850,000	550,000	300,000
Neurosciences Research Foundation, Incorporated	100,000		50,000	50,000
Nevada, University of		20,000	20,000	
New Mexico, University of	140,000	330,700	140,000	330,700
New York Institute of Technology		375,400	200,400	175,000
New York Medical College		12,500	12,500	
New York University	41,050	167,240	80,585	127,705
North Carolina, University of	257,600	350,000	221,100	386,500
Northeastern University	105,000	18,400	54,200	69,200
Northwestern University	8,050	88,670	79,470	17,250
Notre Dame, University of	100,000		100,000	
Oberlin College	25,000		25,000	
Occidental College	35,000		35,000	
Ohio State University	110,900		110,900	
Olive-Harvey College		6,000	6,000	
Oregon, University of		90,000	90,000	
Palace of Arts and Science Foundation		20,000	20,000	
Pennsylvania, University of	100,000	17,200	58,300	58,900
Pittsburgh, University of	86,610	17,150	96,860	6,900
Prairie View A&M University	100,000		50,000	50,000
Pratt Institute		20,000	20,000	
Princeton University	455,400	119,550	197,725	377,225
Purdue University	157,500	15,080	165,290	7,290
Queen's University	7,820		7,820	
Reed College	53,837		53,837	
Regional Plan Association, Inc.		10,000	10,000	
Research Foundation of The City University of New York	209,000	7,761	116,761	100,000
Research Foundation of State University of New York	341,035		201,035	140,000
Rice University	8,050		8,050	
Rochester, University of	11,500	400,000	11,500	400,000
Rockefeller University	125,000		62,500	62,500
Rutgers University		40,825	23,000	17,825
SIAM Institute for Mathematics and Society		58,000	29,000	29,000
Sloan-Kettering Institute for Cancer Research	2,000,000	200,000	600,000	1,600,000
Smith College	62,000		31,000	31,000

	AUTHORIZED	CHANGES DURING 1974		AUTHORIZED
	BUT NOT DUE DEC. 31, 1973	AUTHORIZED	PAYMENTS	BUT NOT DUE DEC. 31, 1974
Southern California, University of	\$ 121,000	\$ 16,100	\$ 129,050	\$ 8,050
Southern Illinois University	11,270		11,270	
Southern Methodist University		19,000	19,000	
Southern Regional Education Board		110,000	55,000	55,000
Southern University and Agricultural and Mechanical College		100,000	50,000	50,000
Stanford University	28,244	427,895	171,589	284,550
Swarthmore College	50,000		25,000	25,000
Tennessee State University		100,000	50,000	50,000
Texas, University of	123,115	22,080	141,975	3,220
Texas Southern University	96,500		96,500	
Toronto, University of		16,100	16,100	
Tuskegee Institute	100,000		50,000	50,000
Urban Periodicals, Inc.		15,000	15,000	
Utah, University of	16,445		16,445	
Vanderbilt University	4,600	379,100	130,650	253,050
Vassar College		112,000	75,000	37,000
Virginia, University of	158,625		158,625	
Washington, University of	160,575	28,790	175,910	13,455
Washington and Lee University	20,000		20,000	
Washington University	8,050	345,887	178,037	175,900
Waterloo, University of	7,590	32,200	25,990	13,800
Wayne State University		16,100	8,050	8,050
Wesleyan University		20,000	20,000	
West Virginia University	11,510		11,510	
Williams College	75,000		75,000	
Windsor, University of	10,925		10,925	
Wisconsin, University of	21,390	58,640	52,660	27,370
Wisconsin Foundation, University of	122,000	16,400	138,400	
Woodrow Wilson National Fellowship Foundation	35,000		35,000	
Worcester Polytechnic Institute		350,000	150,000	200,000
Xavier University of Louisiana	108,400		54,200	54,200
Yale University	109,775	361,200	120,975	350,000
Yeshiva University	200,000		200,000	
York University		16,150	7,825	8,325
Sloan Fellowships for Basic Research to be granted in ensuing year	1,400,000	150,000		1,550,000
Staff Grant appropriation for grants in ensuing year	750,000			750,000
Other appropriations for grants and related expenses	94,762	43,970	30,171	108,561
	14,999,693	15,109,188	13,530,587	16,578,294
Reduction for Grant Transfers		132,692	132,692	
TOTAL GRANTS AND APPROPRIATIONS	\$14,999,693	\$14,976,496	\$13,397,895	\$16,578,294

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This issue of the Annual Report commemorates the 100th anniversary of the birth of Alfred P. Sloan, Jr. The above illustration is from a bronze medallion commissioned by Laurance S. Rockefeller and created by Joy Buba in 1969, three years after Mr. Sloan's death.

Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr. (1875-1966)

Report for 1975

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Program Officer

Robert L. Hermann
Director of Reports and Publications

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Consultant

*Program officer until July 1, 1975; consultant thereafter.

President's Statement



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The year 1975, with which this Annual Report is concerned, was the centenary of the birth of Alfred P. Sloan, Jr., on May 23, 1975. It was Mr. Sloan who created the Alfred P. Sloan Foundation, whose personal fortune endowed it, and whose philanthropic views have left a continuing mark upon the Foundation. It seems appropriate that my own contribution to this Report should recollect the creator and shaper of the institution I now serve.

It cannot, regrettably, be any kind of personal recollection, for I met him only once and then very briefly. I know him primarily in terms of the record of this Foundation as I found it when I became president, two years after his death, and as it has developed since. Dr. Warren Weaver, an associate of Mr. Sloan's both inside and outside the Foundation over a period of more than two decades, has recently written a personal reminiscence which provides an intimate picture of the man: "Alfred P. Sloan, Jr., Philanthropist," by Warren Weaver is available on request from the Foundation. My own contribution must be more limited. Yet in my own way I think I too know the man, by his deeds if not his words.

From the record Mr. Sloan established at the Foundation, certain characteristic attitudes toward philanthropy can be discerned. There is an overriding pattern that emerges from the thousands of grants made by the Foundation from its inception in 1934 until Mr. Sloan died in early 1966—years in which the Foundation distributed almost 128 million dollars.

The first of these characteristics imprinted upon this Foundation by Mr. Sloan was a firm belief in the value of major investments. As Dr. Weaver reports, he was somewhat contemptuous of what he came to call "chicken-

feed" grants. He was of the conviction that all other things being equal it was big money that was likely to make the big difference, and in all he did it was the big difference that Mr. Sloan proposed to make.

Such a belief involved certain corollaries. Virtually from the very outset, the Foundation was a large one, and in principle might have been active over an extremely wide field. Mr. Sloan chose to limit the fields in which the Foundation played a part, in order that in each field in which it was active that part would be a significant one. Initially, the field was economics and management; there was subsequently added science and technology. Throughout its existence, extending into the present, these have remained the areas of activity of the Alfred P. Sloan Foundation and they and their correlates are likely to remain so during the foreseeable future.

Even within those fields, Mr. Sloan tended to concentrate. When he became interested in medical science, the overwhelming bulk of the Foundation's support went to cancer research. The process went even further: that cancer research itself was concentrated for the most part in the creation and the support of the Sloan-Kettering Institute. Over the years, support from the Foundation and from Mr. Sloan to the Institute (and the Memorial Sloan-Kettering Cancer Center of which it is a part) has totaled more than \$58 million—concentration of effort indeed! Directly out of his own initiative and his own funds, one of the world's great centers of medical research on cancer was created, which was precisely what he had intended.

The coupling of economics and management on the one hand and science and technology on the other reflected another aspect of Mr. Sloan's general attitude toward philanthropy. He was, in his own life and career, an eminently practical man, but he was always mindful that sound practice rested upon deep knowledge. Economics to Mr. Sloan was the basic understanding that must underlie the practice of management; science the pure knowledge that must underlie the practice of engineering. In his own business career he was, above all, a manager, and his talent as a manager was incomparable. But he was careful never to delude himself that sheer talent was enough for him or for anyone else; the accumulation of new knowledge of management by means of research and education was at least of equal importance. Similarly, the great industrial enterprise he managed was built upon engineering, but he was always aware that engineering required the constant renewal of scientific knowledge.

It was that attitude that led him to create the second of the great institutions that bear his name: the Sloan School of Management at the Massachusetts Institute of Technology. It was intended from the outset to couple research and practical education; to turn out a new kind of manager endowed with the family of skills that marked the graduate of M.I.T.

The deep faith in educational and research enterprise completed the defi-

nition of the Foundation's program; it was to deal with economics and management, with science and technology and within those areas it was to provide support for research and for higher education.

He was a hard-headed man in his choice of instruments. It was not Mr. Sloan's way to seek out a struggling institution and try to make it marginally better; he looked for the best institution he could find, and if he could not find one he set about creating the best institution he could imagine. He believed that the best work was done by the best people, and it was the best people he sought.

Thus the Basic Research Program of the Sloan Foundation, as he instituted it, was and remains very nearly unique. Year after year it seeks out the best young research scientists in physics, chemistry, mathematics, and (more recently) neuroscience. Having found them, it grants each of them a substantial sum of money with which to move forward their careers during the years in which those careers are first taking discrete shape. How those careers are to be best furthered is a matter for the young scientists themselves to decide. The money may be used for travel, or for equipment, or for released time from teaching duties, or for research assistance. The use of the grant is for the scientist to determine. The Foundation neither dictates nor suggests, and the grant itself is in no way contingent on the nature of the scientist's plans or program. It is to be used to enhance individual capacities in the fashion that the scientist sees fit.

Finally, in his approach to philanthropy Mr. Sloan was unwaveringly radical. He would not have been pleased with such an ascription, at least at first hearing, for in no way was Mr. Sloan a political radical and today that alone is the connotation that the word carries. But a radical he was, in the basic sense of the word which is defined as fundamental, for Mr. Sloan believed in going directly to the root of a matter. He was forever interested not in symptoms but in underlying causes or underlying circumstances; not in patching up the surface but in rebuilding the structure.

Again, the Sloan-Kettering Institute is an example of that practice. Millions of people suffer from cancer, and the suffering is intense. But to Mr. Sloan the great need was not simply to alleviate that suffering, but to obviate it entirely. Stubbornly, he kept his eye on that goal, and he did not always find it easy, for he was not always fully understood. Yet he was aware that even the resources of a great foundation would do little to relieve the present suffering; he had a deep faith that they might go far toward preventing it.

He acted similarly when the Sloan Foundation sought in 1965 to deal effectively with the plight of what were then called "the predominantly Negro colleges." The pressure on the Foundation was for general support of those

struggling institutions. Mr. Sloan, instead, applied Foundation funds to the structural needs of those colleges. Over a brief period, he made available more than \$2 million and expert assistance in providing for a group of those colleges the inner resources to build their own fund-raising capacities from the industrial community, the government, their alumni, and the foundation world itself (not excluding by any means the Sloan Foundation).

Another example was his early interest in National Medical Fellowships, an organization devoted to assisting minority students to become medical doctors. He resisted the admonitions to support health services, medical assistants, and nursing in order to focus the Foundation's resources on M.D. training. Substantial grants for that purpose were made from 1959 to 1966, culminating in a major program from 1967 to 1975 under which the Foundation provided more than seven million dollars for the training of minority M.D.'s.

Those, then, are the four characteristics with which Mr. Sloan marked this Foundation: concentration of its activities, an abiding faith in research and education, a constant search for the best men and the best institutions, an attempt to deal with fundamental problems. When he died at 90, in 1966, it was with those characteristics as well as his fortune that he endowed the Foundation. As this report is prepared, almost exactly ten years after his death, those characteristics remain.

The Foundation has not been static, and yet it has moved almost entirely in directions that conform to Mr. Sloan's deepest intuitions. The inclination to concentrate the Foundation's efforts is reflected today in the Particular Programs of the Foundation, designed to meet problems head on with substantial resources applied over a pre-determined period of time. To economics and management have been added public policy education, still in the same tradition, for the education is largely in economics and applied mathematics. The Foundation's funds still are directed almost in their entirety to research and education within the areas of its activities. Its dealings remain predominantly with the best people and the best institutions, to the extent that it is within our power to determine them. The search for fundamentals continues.

This is probably the way Mr. Sloan would have wanted it, but it is not for that reason that it has come about. The Foundation pursues the course charted by Mr. Sloan because it appears to the trustees and to the professional staff to have been the wisest course.

And if Mr. Sloan himself might have wished it to be that way, it was one of the strengths of the man that a few years before his death he made it clear that he sought to impose nothing upon the institution he was soon to leave behind. In a memorandum for the instruction of those who were to inherit the responsibility for the Foundation, he wrote: "From time to time members of the Board have pointed out to me that the Board was entitled to some expres-

sion of opinion as to how the activities of the Foundation were to be continued after I pass on. I think the suggestion is a constructive one. I appreciate it. On the other hand, with such a rapidly changing civilization as we are living in it is difficult to sit down and discount the future in terms of the present. I do not feel I am capable of doing so. No one can foresee the future in normal circumstances let alone the unusual circumstances of today. . . . The Board controls the business."

Alfred P. Sloan, Jr., was in the great tradition of American philanthropy. Those of us upon whom has fallen the responsibility to continue the principal instrument of philanthropy he created are proud to act in his name.

During 1975 the Board of Trustees acquired four new members and elected a new Chairman; two Trustees retired. Richard C. Gerstenberg became Chairman on April 1, 1975, succeeding Frederic G. Donner, who had been Chairman since 1968. On the same date Mr. Donner retired from the Board, on which he had served since October 18, 1966. Both Mr. Gerstenberg and Mr. Donner are former chairmen and chief executive officers of the General Motors Corporation.

Albert L. Williams retired from the Board on April 1 after five years as a Trustee. He is a former president of the International Business Machines Corporation.

New Trustees elected April 1, 1975, are:

Lloyd C. Elam, president of Meharry Medical College;

Frank A. Petito, chairman and managing director of Morgan Stanley & Co. Incorporated; and

George P. Shultz, president of the Bechtel Corporation and a former Secretary of the Treasury.

A fourth new Trustee elected on October 7, 1975, is Lucy Wilson Benson, former president of the League of Women Voters of the United States.

Miss G. Wesell

Particular and General Programs

Because the operating concept of the Alfred P. Sloan Foundation differs from that of other general-purpose foundations, a few words of explanation are in order. The Foundation's efforts and resources are divided between a General Program and a limited number of relatively short-term, closely focused Particular Programs. The General Program, representing approximately 60% of annual grant allocations, carries forward the Foundation's broad traditional interests in science and technology and in economics and management; in addition it permits a flexible and selective response to problems of society related to those interests. The Particular Programs, normally three in number and representing approximately 40% of annual grant allocations, are designed to concentrate specified resources over limited periods of time on problems which may be amenable to sharply focused and relatively short-term approaches. A Particular Program usually involves an expenditure of from \$10 million to \$15 million over a period of from five to seven years. New Particular Programs are launched as existing ones expire. The first such program, now terminated, was concerned with Minorities in Medicine and Management. Two subsequent Particular Programs, both of which are scheduled for termination in 1976, are in Neuroscience and in Technology in Education. A program on Minority Engineering Education was activated in 1973.

Particular Programs



Minority Engineering Education

The Foundation's fourth Particular Program is designed to deal with the problems faced by members of certain minority groups in gaining access to the profession of engineering. Some \$2.1 million was committed for this purpose in 1975, bringing the total thus far to some \$3.8 million.

When the Foundation first began systematically to explore this problem in 1973, it was estimated that well under 1 per cent of the nation's 1.1 million practicing engineers were members of the Black and other minority groups. A Sloan-supported task force which made an exhaustive study of the situation reported late in 1974 that it might be feasible by concerted efforts to increase the minority proportion of first-year engineering students to 18 per cent by 1982.

Those efforts are beginning, and there is some evidence that the 18 per cent goal is not a visionary one. The task force projected minority freshman engineering enrollments rising from 2,172 students in 1972 to 13,500 in 1982; by the Fall of 1975 that figure had reached an estimated 5,970*, almost the level projected for the Fall of 1976. Over-all freshman engineering enrollment rebounded rapidly in 1974 and 1975 from the recent low in 1973, but even on that larger base the minority freshman percentage rose from 5.6 in 1973 to 7.8 in 1975.

Guided by the findings of the task force, the Foundation in 1975 concentrated resources under this Particular Program in three categories: the creation of a financial aid mechanism, steps to stimulate cooperation among

* Estimate derived from preliminary data from the Engineering Manpower Commission of the Engineers Joint Council.

engineering colleges, and efforts to influence minority students, their families, and secondary schools to consider engineering study and make the necessary preparations for it. (Grants to strengthen the six traditionally Black engineering colleges, a principal source of minority engineers, were made in 1973 and 1974.)

A program emphasis which emerged during the year, and which is expected to become the central feature of the program in 1976, is the development and dissemination of new curricular materials for pre-engineering preparation at the secondary-school level. Evidence of this growing interest will be found in a number of the grants approved for minority engineering education in 1975.

Student Financial Support

Lack of adequate financial aid was identified by the Foundation-supported task force as the single most important barrier to increasing minority participation in engineering. Corporations and other organizations are showing increasing interest in assisting minority engineering students, but if minority enrollments are to rise as projected, a large and growing unmet need will remain. To raise these funds and distribute them, the task force recommended establishment of a new national scholarship organization.

• The National Fund for Minority Engineering Students, designed to help close the gap between resources and need for thousands of disadvantaged students over the next several years, began operating at its New York headquarters in May of 1975. The National Academy of Engineering, through the Committee on Minorities in Engineering of the National Research Council, was responsible for its creation, with the assistance of a grant from the Sloan Foundation. The task of NFMES is twofold: to raise from corporations, foundations, and other donors the substantial funds needed to effect a significant increase in the pool of future engineers from four minority groups—Blacks, Chicanos, Puerto Ricans, and American Indians; and to distribute those funds in such a way as to advance progress toward its objectives.

NFMES has engaged as its president Garvey E. Clarke, an experienced administrator of similar activities, and is assembling a board of trustees from leaders in industry, education, and minority affairs. For its first three years its administrative expenses will be largely met by a grant of \$800,000 from the Sloan Foundation, so that additional funds raised can be earmarked for scholarships. The Fund's stated purpose is to augment, not replace, resources at present going into the support of minority engineering students.

In the present academic year NFMES is conducting a pilot program to test its system for delivery of funds and to demonstrate its capabilities to students, engineering schools, and potential donors. For the 1976-77 academic year it expects to distribute some \$1.4 million in 1,100 awards averaging about \$1,200 each. It will work through selected engineering schools which meet

certain criteria for participation, using accepted methods for evaluating individual students' levels of financial need. More than 150 engineering schools have expressed interest in participating in the program; schools are expected to have effective and aggressive programs of identifying and recruiting qualified minority students.

The Foundation's program in minority engineering, unlike its earlier program in minority medicine and management, does not provide direct scholarship aid to students, for the number of students to be assisted and the amount of funds required are so large that the Foundation's own funds would have little direct impact. Assuming maximum use of existing federal, state, and university student-aid resources, and increased contributions by students to the cost of their own education through work or loans, the new funds needed to reach the objective may be on the order of \$50 million or more over the next five years. This is a sizable but not unmanageable sum. NFMES will be calling upon industries which employ large numbers of engineers for help in educating future minority employees. Some corporations already have pledged substantial amounts. The Foundation's contribution to minority engineering students is indirect, through operational support of the fund-raising and aid-administration staffs of NFMES, and through support of programs such as those which follow.

Interinstitutional Cooperation

Early in the planning of the Particular Program on Minority Engineering Education, it was recognized that participation by schools of engineering would be essential to the success of the program, and that such participation could be organized most efficiently on a regional basis. Meetings were held in several sections of the country to explore the formation of regional consortia of engineering schools, and several of them have come into being or are in the process of being established. Participating schools can benefit in a number of ways: they can share and learn from one another's experiences, they can coordinate approaches to secondary schools and to individual prospective engineering students, and they can conduct unified fund raising efforts to help meet expenses of their special programs for minority students.

- The Committee on Institutional Cooperation has brought together fourteen Midwestern engineering schools in a coordinated effort to motivate and prepare minority high school students for college engineering study. Deans of the schools have recognized that preparation for engineering study, unlike preparation for law or medical school, must take place at the secondary school level. Students in inner-city schools (where most minority pupils are found) usually have little or no exposure to engineers, hence they have no "role models"; they tend to avoid mathematics and science as being perhaps too difficult; and their parents, teachers, and school counselors are not likely to be well informed about opportunities in engineering and the necessity for early identification

and preparation of those students who might progress to engineering studies. The fourteen Midwestern schools plan to intensify their efforts to overcome these obstacles.

(The Committee on Institutional Cooperation (CIC) is the academic consortium of the Big Ten universities and the University of Chicago. The new program is called CIC + MPME (Midwestern Program for Minorities in Engineering) and includes two non-CIC universities, the Illinois Institute of Technology and the University of Notre Dame. Participating members of CIC are University of Illinois, Urbana-Champaign; University of Illinois, Chicago Circle; Indiana University-Purdue University, Indianapolis; University of Iowa; Michigan State University; University of Michigan; University of Minnesota; Northwestern University; Ohio State University; Purdue University; University of Wisconsin, Madison, and University of Wisconsin, Milwaukee.)

The universities in the CIC + MPME program are initiating and expanding individual institutional efforts which include increased communication with senior and junior high schools to identify talented minority students and encourage them to enroll in preengineering courses, and to help schools and teachers improve instruction in such subjects. Contacts with local minority communities are being increased, and direct instruction offered, both in the schools and on university campuses, to upgrade student competence in mathematics and science.

The consortium, through its executive director, governing board, and an outside advisory committee, provides for centralized policy determination, evaluation of projects, and allocation of project funds to the participating universities, each of which has a project director for the program. The Foundation provided \$750,000, payable to Northwestern University, for the first two years of the program.

- The Southeast Consortium, composed of seven engineering institutions, also came into being in 1975 and received some modest initial support from the Foundation. Its members, situated in the states of Alabama, Florida, Georgia, South Carolina, and Tennessee, are near large minority population centers and have begun to work with schools in their areas to improve the outlook for greater numbers of minority engineering students.

In addition to their other activities, the Southeast and other consortia will have important roles to play if, as is suggested below, a major new effort to develop and introduce new pre-engineering curricula into the secondary schools materializes. Pending the full activation of the Southeast Consortium, presumably in 1976, three member institutions received grants of \$20,000 each to begin the process of making contact with inner-city science and mathematics teachers. Recipients were the University of Alabama, University of Florida, and Georgia Institute of Technology, which also received \$11,100 for initial organizational expenses of the consortium.



Visits to technological industries were a feature of the Minority Introduction to Engineering program in 1975. A group from Lehigh University learns about the process of machining a closure head for a nuclear reactor at the Bethlehem Steel Corporation.

The other members of the Southeast Consortium are the University of South Carolina, University of Tennessee, Tennessee State University, and Tuskegee Institute.

- In a third geographic area, the Philadelphia Regional Introduction for Minorities to Engineering (PRIME) engages in a wide range of activities intended to increase the number of minority students from the Delaware Valley area of southeastern Pennsylvania, southern New Jersey, and northern Delaware. PRIME is an amalgam of six colleges and universities (Drexel University, University of Pennsylvania, Spring Garden College, Temple University, Villanova University, and Widener College) with school districts, businesses, professional societies, government agencies, students, and community groups.

PRIME expects to act as a resource center for information and services for minority students and to purvey understanding of engineering study as career preparation throughout the region. It will help to coordinate minority engineering programs among colleges and universities of the area, assist in the development of curricula leading toward engineering careers, and seek to stimulate industry-supported pre-engineering programs. PRIME expects to raise funds for programmatic activities from participating corporations and other

sources. Primarily for support of a central staff, the Foundation granted \$60,000 to PRIME.

- For support of the planning phase of a proposed California Consortium for Minorities in Engineering, a grant of \$19,827 was made to the California State University Foundation, Northridge.

Early Intervention

"Recruitment, motivation, and remediation" has been the key phrase in many proposals to overcome the under-representation of minorities in engineering, and the Foundation has supported a number of such projects. It is vital that engineering schools make a serious effort to identify promising minority students, to enroll them, to encourage them, and to give them extra academic support. But there is a growing realization that for many such students, remedial efforts after they are in college may be too late. The rigors of the engineering curriculum may make catching up almost impossible for many who come poorly prepared from high school. And many inner-city high schools are at a disadvantage, despite numerous examples of capable and dedicated teachers, in imparting the mathematical and scientific prerequisites for engineering study.

This perception was crystallized at a two-week summer study convened by the Foundation at Chatham, Massachusetts, in June of 1975. Styled the Chatham Summer Study on Pre-engineering Education, it involved as participants some thirty experts largely from the fields of engineering education and secondary education. A report by the steering committee for the study, chaired by Robert G. Jahn, dean of the School of Engineering/Applied Science of Princeton University, was published by the Foundation.*

A principal finding of the Chatham Summer Study was that there exists an urgent need for new and adapted curricular materials in science, mathematics, and communication skills to enable secondary-school teachers effectively to prepare minority students for undergraduate engineering education. It was the view of the Summer Study that some existing pre-engineering materials may be adaptable for use in inner-city schools, and that regional consortia of engineering schools could play an important part in developing needed new materials. A new national enterprise, however was deemed essential to provide the major initiative, to assure coordination and communication, and to see to the introduction and utilization of the new materials.

- As a step toward the creation of such a national center, Dr. John G. Truxal, a participant in the Chatham study, has conducted a study of organizational and operational aspects, supported by a \$10,000 grant to the State

* *Minorities in Engineering: The Chatham Summer Study on Pre-engineering Education. Report of the Steering Committee.*

University of New York at Stony Brook, where he is dean of the College of Engineering and Applied Sciences. His report was received in December 1975, and will be under consideration at the Foundation early in 1976.

- MITE (Minority Introduction to Engineering) is a two-week summer program for minority high-school students sponsored by the Engineers' Council for Professional Development (ECPD). The program, conducted on college and university campuses around the country, provides the students (mostly post-juniors) with reinforcement in mathematics and science and exposure to college and engineering environments. Support is from industry and, for the 1975 summer program, from a \$190,000 Sloan Foundation grant.

During 1975 ECPD was able to expand the MITE effort to 33 programs at 25 colleges involving some 1,200 students. (There were ten programs and 350 students in 1974.) ECPD reports that 80 per cent of the 1974 participants have indicated a choice of engineering as a career.

- One of the possibilities considered by the Chatham Summer Study was the provision of alternative high schools for students having a definite interest in becoming engineers. The Western Institute for Science and Technology operates such a school experimentally in Waco, Texas, and is advising the Houston Independent School District on the establishment and operation of a similar school in Houston. Called the High School for Engineering Professions, it will offer a core of applied mathematics, physical science, and pre-engineering courses, while permitting enough flexibility for a student to decide later to major in a physical science, mathematics, or some other subject. Admission is competitive, and under Houston's integration plan the first year student body is approximately 88 per cent minority.

The Western Institute for Science and Technology, whose president is Dr. R. Louis Bright, received a grant of \$61,000 for its assistance in planning the new Houston school.

- In the San Francisco Bay area the University of California, Berkeley, is working with four secondary schools to raise the achievement of minority students in science and mathematics, with the goal of increasing the number of minority students qualified for admission to engineering colleges and collegiate science studies. The program, called MESA (Mathematics, Engineering, Science Achievement) is conducted by the University's College of Engineering and the Lawrence Hall of Science in cooperation with volunteers from the faculty, student body, industry, and the public schools. It functions entirely within the public school system, utilizing existing advanced science and mathematics courses enriched by special tutoring, counseling, lectures, field trips, and summer employment. Special honors and other rewards stimulate students to set and maintain high standards for themselves. During the first nine semesters, 75 per cent of MESA graduates have gone on to four-year colleges or

universities, and about two thirds of those have entered the fields of engineering, science, and mathematics.

MESA, which may serve as a model for similar programs in other areas, has received considerable support in the Bay area and hopes to become firmly established on that basis. For its partial support over the next two years, the Foundation made a grant of \$55,000 to the University of California, Berkeley.

- In Milwaukee a project receiving partial Foundation support is increasing the number of minority graduates in engineering from Marquette University. Initiated by a nonprofit corporation called INROADS, Inc., the program enrolls gifted students in the ninth grade and provides intensive year-round instruction, in addition to regular high-school work, for four years. Upon acceptance into Marquette's engineering school, the student is assured of full financial aid to graduation, if necessary, coupled with summer employment in technological firms. INROADS is increasing the number of students in the Marquette program from 30 ultimately to 60, with 15 graduates a year projected.

The INROADS operation has been successful in other cities, adapted to local needs and involving cooperation of the higher education community, the business community, and the public schools. To assist in the expansion of the Milwaukee program, the Foundation made a one-year grant of \$40,000 to Marquette University.

- For a series of meetings to consider elementary and junior high-school mathematics education, with particular attention to the needs of potential minority engineering students, Education Development Center received \$20,000.

- For a Parent Information Program for Engineering, including the issuance of a final report, the Urban League of Cleveland was awarded \$17,500.

- In partial support of a Pre-engineering Summer Program for minority high school students at the University of Wisconsin, Madison, the University received \$20,000.

Other 1975 grants related to minority engineering education:

American Society for Engineering Education, Washington, D.C. \$5,000
For reprinting and distribution of *Minorities in Engineering: A Blueprint for Action*.

Dallas County Community College District, Dallas, Texas \$11,450
In partial support of a Texas Workshop on Minorities in Engineering held in October of 1975.

University of Texas, El Paso, Texas \$11,000
For planning the development of a program to increase minority participation in engineering.

Technology in Education

Since its inauguration in 1971 the Particular Program on Technology in Education has led to commitments of over \$6 million. By a recent count some 400 faculty members on more than 100 campuses were receiving Foundation support for experiments in educational technology. These scholars have prepared about forty full courses of instruction, plus hundreds of hours of other kinds of materials. In engineering, grants have been made to convert much of the first two years of the curriculum to technology-based instruction, including remedial instruction and engineering laboratory.

The objective in this program has been to help reduce or control the cost and improve the quality of higher education with the assistance of technology. It cannot be said at this point that the objective has been attained. It may be in time, but not within the usual five- to seven-year life of a Particular Program. Final grants under this program will be made in 1976.

Technology in Engineering Education

Although the program on Technology in Education has supported experiments in a broad range of subjects—art, music, languages, genetics, medicine, economics, and history, for example—a large number of grants have been made in the field of engineering, reflecting the fact that more people with promising ideas were found in engineering than in other fields.

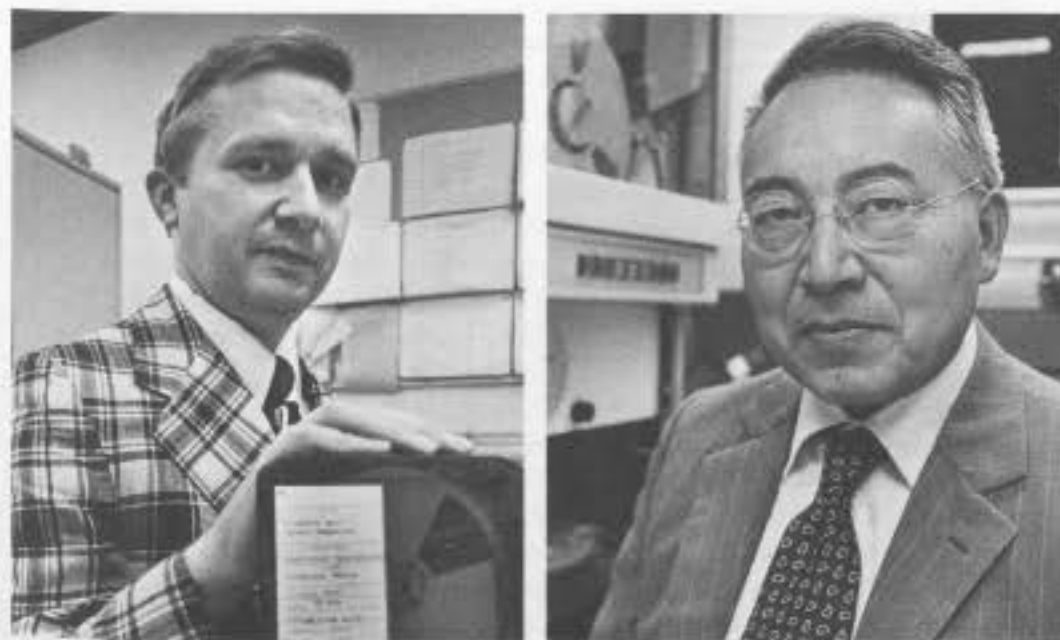
- Case Western Reserve University, faced with an increasingly diverse student body in its Case Institute of Technology, has been experimenting with self-paced learning modules which enable students of varying backgrounds to master a topic at their own pace, repeating material as necessary. The success

of this experiment, partly supported by Sloan, led Case to propose that most of the basic engineering courses in its core curriculum be packaged in such modules. The modules will not eliminate classroom instruction, but will provide students of differing degrees of preparation with an alternative and supplemental means of mastering the required material.

The learning modules will combine audiovisual techniques with computer terminals and "hands-on" experience in the laboratory. Four access centers, including one in a dormitory area, are planned; each will be equipped with a color TV monitor and videotape playback unit, a slide projector and audio playback unit, a computer terminal with keyboard, a cathode ray tube display unit, and a teletype printout. Students' progress will be monitored by computer.

The project is under the general supervision of Dr. Yoh-Han Pao, chairman of the department of electrical engineering and applied physics, and is administered by Dr. Frederick W. Phelps, Jr., professor of electrical engineering. A three-year Sloan grant of \$295,000 will support development by Case faculty of the learning modules.

- At Southern Methodist University an effort is being made to lighten the instructional burden in the undergraduate engineering laboratory, typically a time-consuming and expensive teaching process which must deal with students



Self-paced learning modules will enable students at Case Western Reserve University to master at their own pace most of the basic engineering core curriculum. Prof. Frederick W. Phelps, Jr., holding a video cassette of the type used in the project, and Prof. Yoh-Han Pao are in charge of developing the modules.



A videotaped lecture is added to Worcester Polytechnic Institute's extensive library of recorded instruction on engineering subjects. A student operates the control booth as an instructor, monitored by remote-controlled cameras, delivers a lecture. Expansion of the system will continue with Sloan assistance.

from many different backgrounds. Three self-instructional pilot modules were developed, with Sloan assistance, using mostly low-cost audio cassettes keyed to slides and printed instructions. On the basis of this experience, SMU proposed to turn the entire core of the engineering laboratory into a self-paced system through the development of 132 modules. Fifteen members of the SMU Institute of Technology faculty will be involved in developing and testing these modules over a two-and-a-half-year period.

The modules are expected to have a high degree of exportability to other engineering schools faced with the same problem of handling large numbers of students in the laboratory, and SMU's plans include wide dissemination of the system. The Foundation made a three-year grant of \$250,000, principally for time spent by faculty members on the development work.

- Videotape has become an important instructional tool at Worcester Polytechnic Institute, which has accumulated a library of more than 1,000 tapes of varying length on engineering subjects. Viewing stations are in almost constant use by students who wish to repeat a lecture or master particular topics at their own convenience. WPI also plans to tape entire graduate courses for off-campus study by working engineers in the central New England area.

The WPI videotape operation is entirely "home grown," and employs minimal facilities. Faculty members are taped in a small studio or in their own laboratories, using remote-controlled cameras and recording equipment under the control of a single operator. Students maintain equipment and make their own tapes. WPI is building an instructional television classroom for taping of lectures in a more natural setting, with interaction between students and instructor.

To help support the continued growth of the WPI television-tape system, the Foundation made a three-year grant of \$85,000 to meet part of the personnel costs involved.

- The problem of safety assessment has received insufficient attention in engineering education and in engineering practice. The estimation of risk in the design, for example, of nuclear power plants, highways, aircraft, off-shore oil rigs, chemical plants, and even television sets is a professional skill that increases steadily in importance as society becomes more and more dependent on complex technological systems. Yet systems safety analysis is widely neglected in engineering education.

Two engineering educators who have given a number of short courses in systems safety analysis to on-the-job engineers have proposed a means of incorporating this subject more readily into engineering curricula. They propose to develop a series of forty small self-instructional modules which can be studied independently or integrated into engineering courses in a variety of ways. They have developed much of the needed instructional material and have had experience with instructional modules.

The two engineers who will conduct this project are Dr. Ernest J. Henley, professor of chemical engineering and associate dean of the Cullen College of Engineering of the University of Houston; and Dr. Gary J. Powers, associate professor of chemical engineering at Carnegie-Mellon University. The Foundation made a grant of \$44,000 to the University of Houston to support their work.

Faculty Training

The shortage of able faculty members with extended training and experience in educational technology continues to be a major obstacle to the wider use of technology for instruction in colleges and universities. One previous Technology in Education grant directly addressed this problem; it is helping to support a number of candidates for the Doctor of Arts degree, with an emphasis in educational technology, at the University of Illinois at Chicago Circle.

- At Purdue University Prof. S. N. Postlethwait, a biologist and a leading developer of the audio-tutorial method of instruction, operates an experimental teaching laboratory where he trains Purdue faculty and occasional visitors in his techniques. The audio-tutorial method, now widely used in the teaching of botany and biology, is a system of self-paced instruction that uses

audio devices and color slides linked to programmed texts and laboratory apparatus. The system is being adapted to other fields of study, and Dr. Postlethwait conducts faculty workshops on audio-tutorial techniques throughout the world.

Dr. Postlethwait in recent years has trained a number of new Ph.D.'s in the preparation of self-instructional materials, but he also considers it important that experienced, mid-career people, having a strong influence in their departments, have an opportunity to learn the new methods. He therefore proposed a program of mid-career internships for established scholars who would work under his direction, in most cases for a full academic year. He believes that once such a program becomes established, it will be fully supported by institutions sending interns to it. The Foundation made a grant of \$188,000 to Purdue for partial support of the internships over a three-year period.

Computer-Assisted Instruction

The computer, whatever else it may be, has been found to be one of the most stimulating pedagogical tools yet devised. As one of the most advanced and most powerful products of the technological era, it exerts a singular attraction for educators and students through not only its enormous computational capacity but also its ability to portray real-world situations and to illuminate possibilities through games and simulations. With the advent of the minicomputer, and soon the microcomputer, costs are likely to fall within the next decade to the point where computer-assisted instruction will permeate the curricula of many institutions, provided the necessary software materials are available. A demonstration of how such an institution-wide instructional system would work at the school or college level remains to be done, however.

- At the Spence School, a private girls' school in New York City, every student from grades one through twelve receives some computerized instruction in mathematics. Spence's headmaster, Dustin Heuston, has assembled a thirty-terminal system which serves not only Spence's 500 students but also the students of six other independent schools. The results at Spence have been a rise in standard mathematics test scores, growing enrollments in science courses, and an increasing number of Spence graduates entering science and technology fields in college.

As the next step toward a comprehensive system of instruction based on minicomputer technology, Spence seeks to extend the present system to the English curriculum, doing for English grammar, mechanics, and composition what has been done for mathematics. Refinement of the mathematics program will also continue. For this expansion Spence will need additional hardware, programmers, and time for its teaching staff to develop the English computer software.

The Spence computer system, when further developed, seems likely to

serve as a prototype for other and larger future systems. Sloan grants to institutions at the pre-college level have been rare, making this case an exception. A grant of \$150,000 to Spence was approved toward the project's total budget of \$388,000.

- Rollins College in Winter Park, Fla., has acquired a computer dedicated to instructional use, enabling its science faculty to launch the first phase of a projected institution-wide program in computer-assisted instruction. Fifteen demonstration modules will be designed to illustrate basic concepts of modern physics, astronomy, chemistry, biology, and mathematics. For example, a module on the orbital motion of satellites and binary stars will allow students with widely divergent academic interests to view processes that take weeks, months, or centuries to occur in nature. The units are planned as self-contained computer programs that can be integrated into various courses, especially those for non-science majors.

The Rollins scientists expect to develop techniques for producing interdisciplinary modules that will be adopted in the future by the social science and humanities departments, and by other liberal arts colleges as they become interested in computer-assisted instruction. The Foundation made a grant of \$35,000, payable in 1976, for half the cost of the project.

Other grants for educational technology projects in 1975:

Buena Vista College, Storm Lake, Iowa	\$20,000
To enable faculty members to utilize a new minicomputer in experimenting with new teaching techniques in botany, ecology, and business.	
Colorado State University, Fort Collins, Col.	\$14,500
For planning and program development of a consortium of universities offering on-the-job television-based instruction to persons working in engineering and other fields.	
Education Development Center, Inc., Newton, Mass.	\$19,000
For production of demonstration modules combining film, videotape, and printed materials, for the continuing education of school administrators.	
University of Florida, Gainesville, Fla.	\$17,900
For partial support of a University committee to review developmental work in educational technology and to plan for additional experimentation.	
Lincoln Center for the Performing Arts, Inc., New York, N.Y.	\$19,600
For partial support of a project of the Lincoln Center Institute in the use of portable videotape television for improving the arts programs of public schools.	

Neuroscience

Neuroscience has become a discipline made up of many disciplines. It may exist scattered across many departments and divisions of a university, wherever an anatomist, a chemist, a pharmacologist, a physiological psychologist, or an electrical engineer is trying to analyze what happens in and between brain and nerve cells. The impetus of the Particular Program in Neuroscience has been to bring these disparate disciplines together, often in one laboratory, to focus diverse skills in a unified approach to the central problem of how the nervous system functions and what role it plays in the behavior of animals and man. Concurrently, a number of new Ph.D. programs have been established, helping to insure the future continuity of neuroscience as a coherent discipline.

Since the first neuroscience grants in 1970 the program has committed some \$11.4 million to this effort, including \$1.8 million in 1975. In addition, nearly \$600,000 has been provided to young neuroscientists through the Sloan Fellowships for Basic Research (see Page 38), making a total of slightly over \$12 million invested in the development of the discipline of neuroscience.

This Particular Program will end in 1976, although Sloan Fellowships for neuroscientists will continue, and it will then be time for an assessment of what has been accomplished. During 1975 the Foundation and its senior neuroscience advisors identified three more institutions where important new initiatives were taking place; two significant training programs worthy of encouragement; two principal centers of strength where final grants were warranted; and several promising smaller projects, both new and previously supported.

Major New Initiatives

- The Salk Institute over the past five years has developed, partly with Sloan assistance, a capacity for research in the chemical and cellular aspects of brain function. In 1975 it moved to establish a new Laboratory for Behavioral Neurobiology, to be headed by an exceptional young neuroscientist, Dr. Floyd Bloom. When this expansion of activity is completed, Salk will have a major neuroscience research center embracing the study of synaptic pharmacology, dealing with the chemistry of message-carrying molecules in the brain; cytochemistry, concerned with the structure of nerve cells and their chemical makeup; developmental neurobiology, the examination of the formation of connections among cells in the maturing brain; and psychobiology, the controlled testing of behavior in conjunction with observations of brain cell activity.

Other foundations have committed \$1 million for preparing and equipping new laboratory space for the program at Salk, and it is anticipated that federal support for Dr. Bloom's work will become available once his laboratory is established. The Sloan Foundation granted \$315,000 to cover operating costs for the first year.



Dr. Floyd Bloom will head the Laboratory for Behavioral Neurobiology being established with Sloan support at the Salk Institute in La Jolla, Calif. The expansion will give the Institute a major neuroscience research center with a capacity to explore numerous aspects of brain-behavior relationships.

- Washington University has a history of more than 50 years in research on the nervous system; its faculty includes many distinguished neuroscientists in a dozen or more departments. In 1974 the University decided to bring together some of this activity, with specific training responsibilities, in a new Division of Neurobiology headed by Dr. W. Maxwell Cowan, who is also chairman of the Department of Anatomy in the School of Medicine. Training activities of the new division will be at the pre- and post-doctoral level, as well as the undergraduate level. Eight faculty members will be assigned to the new division, and provision is being made for three additional faculty members. The University is equipping new laboratory space for the division, whose research will center on nerve cell biology and the development and function of connections between nerve cells.

With these developments under way, the Foundation approved a three-year grant of \$300,000, primarily for training purposes.

- Stanford University in 1975 acted to achieve more coherence in its extensive neuroscience research through establishment of a Department of Neurobiology in its School of Medicine. The department's chairman is Dr. Eric M. Shooter; it is expected to have a faculty of about nine. One of the catalysts to creation of the new department was a contribution from the Fairchild Foundation for a new building to be called the Sherman Fairchild Center for the Neurosciences. The new department expects to focus on certain aspects of the nervous system, such as how nerve cells grow, drawing upon the research work of scientists in other departments as necessary. Principally for support of junior faculty and training activities, the Foundation made a three-year grant of \$270,000 to Stanford.

Summer Training Programs

- Since 1970 scientists trained in a variety of disciplines have been spending summers at Cold Spring Harbor Laboratory on Long Island, learning to do research in neuroscience. The program, assisted by a 1970 Sloan grant of \$450,000, is designed for young scientists from such fields as physics and electrical engineering as well as geneticists and other biologists not familiar with neuroscience. Visiting scientists from many institutions conduct an introductory course, a course in experimental techniques, and specialized workshops. Many young scientists have gone on to promising, full-time careers in neuroscience.

The director of Cold Spring Harbor Laboratory, the Nobel laureate James Watson, has felt for some time that the value of the summer training program would be enhanced if active, resident research groups were present at the Laboratory. Such scientists, it is felt, would broaden the range of interests and provide a greater depth of material for the summer program. To house such research groups, Cold Spring Harbor is renovating an old laboratory and is

seeking funds for research support. The Foundation made a three-year grant of \$165,000 for research.

- The Marine Biological Laboratory at Woods Hole, Mass., since 1957 has conducted a summer course in classical neurophysiology through which many young scientists have received training that has led to important contributions to neuroscience. This course has now been extensively modified to deal with a broader cross section of the newer concepts and techniques of contemporary neuroscience. The new course emphasizes the interrelation of the variety of techniques—chemical, electrical, and anatomical—involved in modern neuroscience research. Lectures, seminars, conferences, and laboratories have been designed around a six-block format, each block focusing on an important aspect of the field such as tissue culture or electron microscopy. About twelve students, ranging from advanced undergraduates to postdoctoral fellows and all having some experience in related biological research, are accepted each summer.

For partial support of the new program at the Marine Biological Laboratory over a three-year period, the Foundation granted \$107,000.

Centers of Excellence: Terminal Support

- One of the original goals of the Particular Program in Neuroscience was to establish a number of highly visible and successful interdisciplinary centers of excellence where the unifying principles which would define neuroscience as a discipline could be developed. Massachusetts Institute of Technology, building on existing strength in many departments, has created one of the most notable such centers with the aid of Sloan grants totaling more than \$1.5 million. The MIT neuroscience program, headed by Professor Hans-Lukas Teuber, has brought together distinguished investigators from across the entire spectrum of neuroscience and has organized a related training program including an undergraduate elective course which has had the largest enrollment in the Institute.

Over the past five years the MIT neuroscience program attracted other public and private support but not on the scale which was anticipated when Sloan support began. Recent economic conditions have made the transition somewhat slower than expected, and the program in 1975 faced a gap in the resources needed for full operation. The Foundation agreed to provide supplemental support of \$300,000 over two years, primarily for younger scientists and technical help.

- The University of Virginia, which first received Sloan neuroscience support in 1972, has the only group of scientists outside the Soviet Union with the capability of conducting a broad-scale comparative study of brain function and structure across a wide variety of animal species. Since 1972 Virginia has added some outstanding new faculty members and has attracted younger

scientists of high caliber for advanced training. Recently a distinguished neuropharmacologist, Dr. Theodore Rall, has added his capacities for chemical investigations of the nervous system to the strengths of the Virginia group.

In the light of the progress at Virginia, and primarily for initial support of Dr. Rall's research and support of junior scientists, the Foundation approved a terminal three-year grant of \$254,000 to the University of Virginia.

Smaller Projects

- The brain's response to voices and other sounds is being studied with the help of a \$20,000 grant to the Callier Center for Communication Disorders, Dallas. The work is viewed as the first step in a major investigation of the human auditory nervous system, for which other support is being sought.
- At the New York Hospital-Cornell Medical Center a program in developmental neurobiology is being established by the Departments of Neurology and Pediatrics. Through a combination of basic and clinical research, supported in part by a \$20,000 grant to Cornell University, the program seeks to expand understanding of brain and nervous-system development and disorders associated with that process.
- The University of North Carolina at Greensboro is initiating a training program in behavioral neurobiology with the assistance of a \$20,000 Sloan grant. The funds will be used by the Department of Psychology for predoctoral training.
- The University of Minnesota, Duluth, received \$20,000 in supplemental support of a research program on the actions of viruses on nerve cells. This project received support of \$100,000 in 1973.
- Research at Northwestern University concerned with chemical changes in the brain associated with the formation of memory received supplemental support of \$10,000. Previous support for this research totaled \$105,800.
- A neuromorphology research program at Columbia University, established with Sloan assistance, received supplemental interim support of \$8,453.

Other grants in 1975 for the advancement of neuroscience:

Society for Neuroscience, Bethesda, Md.	\$11,680
In support of a seminar for science writers to be held in the Spring of 1976.	
Temple University, Philadelphia, Pa.	\$10,400
In support of a conference on Neural Control of Locomotion.	

General Program



Economics and Management

The importance of research and education in economics hardly needs to be emphasized in a Report for 1975. The Foundation's concern in this area is reflected in its grants over the past several decades. Education of future managers for business, government, and other institutions also receives continuing attention.

It was decided in 1974 that the principal focus of the Foundation's economics program would be on microeconomics—the dynamics of individual markets that confront the industrialist, the manager, the entrepreneur, and the public servant.

Microeconomics Research and Education

Without denigrating the importance of economics research on a national or global scale, some of which the Foundation continues to support, the Foundation's economics consultants concluded that research in microeconomics needed stimulation both in theory and in application to the immediate problems of government and business. There was not in being a sufficient effort to train economists possessing such skills and to identify the field of microeconomics as a challenging and prestigious area of concentration. A score of leading economics departments were invited to propose solutions, and the first two grants for microeconomics programs were made in 1974, to Stanford University and the University of California, Berkeley. Six additional grants, each for \$210,000 over a period of three years, were made in 1975.

- The University of Chicago is establishing a working group of faculty and graduate students to study the economics of the family. The group will

consider such subjects as family formation and stability, the productivity of households, and the effect on infant mortality of changes in family income, working mothers, the education of parents, and parental expenditure on children.

- Columbia University's economics department is analyzing personal and group differences in wages and employment. Among the topics for research are subjects such as: Why do people with the same schooling have differential starting wages and differential rates of change in wages? What factors are responsible for differences in human capital stocks and rates of return? What are the effects of family background and of ability on earning power? How do different levels of education affect hours of work per week, weeks of work per year, participation in the labor force, and length of working life? Other studies will deal with the wages and employment of women, and the differential incidence of unemployment among various demographic, educational, and occupational groups.

- Massachusetts Institute of Technology plans studies on the role of economic forces in the evolution and development of public institutions, and the effects of those institutions on economic behavior and performance. Initially, the MIT faculty and graduate students will address such questions as: Why are some industries private, others private and publicly regulated, and others totally public? What institutional variations exist in the provision of public services and how did they evolve? Why in different societies are similar services controlled at different jurisdictional levels? Studies will then be undertaken to determine the consequences of various institutional arrangements on economic behavior and performances.

- Princeton University is conducting a series of closely related student and faculty research projects on the general subject of human resources in the urban economy. As examples of the kinds of topics which can be studied in this project, Princeton cited the following: The provision of local public services and transfers as related to taxation and land use controls; effects of government actions on prices, quality, and location of housing for low-income residents in urban areas; the objectives and effectiveness of revenue sharing; and the interactions between land use and transportation systems in urban areas.

- The University of Wisconsin is establishing a research seminar and a research workshop to assist graduate students in preparing papers on three subjects: state and local decision making on questions of resource allocation, a matter involving rapidly rising numbers of dollars; the voluntary, nonprofit sector, a growing provider of essential services which has been little studied; and child-rearing institutions and their impact on families in determining the rate and nature of human capital formation.

- Yale University proposed a workshop on processes of adaptation and innovation in the American economy, with emphasis on sectors having signifi-



Yale University was one of six recipients in 1975 of Sloan grants for research and education in microeconomics. Dr. James Tobin, Sterling Professor of Economics and chairman of Yale's Department of Economics, conducts a seminar with advanced students.

cant government intervention. The research will explore the wide differences in the ways in which industries adapt to changes in demand and supply conditions, and generate, screen, and spread new technologies. The initial focus of the project will be on the railroad and housing industries.

Economics for Journalists

- Princeton University enrolled in the fall of 1975 its first class of Alfred P. Sloan Foundation Fellows in Economics Journalism, eight in number, ranging in age from 24 to 37. Selected from among 39 applicants, they are in a program specially designed for them by Princeton's Woodrow Wilson School of Public and International Affairs. It includes offerings in microeconomics, macroeconomics, and quantitative analysis of economic and public affairs. An economics workshop designed for the special needs of the fellows also is provided by the program, which runs for a full academic year.

The Foundation made a \$75,000 planning grant for the program in 1974. For the first year of the program \$270,000 was provided in 1975, to cover fellowship stipends, tuition, and operational costs of the program. It is expected that the program will continue for five years.

Public Policy Education

Over the past few years a dozen or so programs in what is called public policy have grown up at major universities around the country. In general they are built upon an interdisciplinary synthesis of analytic methods derived from operations research, applied mathematics, microeconomics, and political sci-

ence. As graduate programs they are intended to prepare students for careers in government at all levels, as policy analysts and policy makers.

- Duke University's public policy program, established partly with the help of a 1972 Sloan grant for a joint undergraduate program in public policy and engineering, has developed several features which make it distinctive among such programs. Unlike the others, it offers an undergraduate major; and the master's degree in public policy is offered only to those who are working concurrently toward an advanced degree in another professional or scholarly discipline. At present most of the concurrent degrees are in law and medicine.

Duke is now seeking to extend the program to offer graduate public policy degrees concurrently with degrees in business administration and in engineering. The size and strength of the Duke program (which has 150 undergraduate majors and 39 graduate students), and the support it enjoys from the administration and other schools at Duke, make it likely that the proposed expansion will be successful. A three-year grant of \$287,500 was approved.

Research on Global Inflation

- The causes of the inflation that has plagued the world since 1972 are the subject of a major three-year study being launched by the Brookings Institution with Sloan assistance. The study will proceed from the thesis that contemporary inflation cannot be understood and controlled when viewed simply as a national phenomenon; inflation must be viewed as an international problem. A first phase of the study, now completed, has reached the conclusion that the problem is political and sociological as well as economic, that external factors are critical to the internal inflation of most countries and to the success of their anti-inflationary policy efforts, that the developed countries can learn a great deal from each other's efforts to check inflation, and that international policy responses may be needed to deal effectively with the problem.

In a major commitment of staff and resources, Brookings will now engage in cross-national comparative analysis of the key functional areas through which inflation afflicts each country. It will seek to define supranational causes of inflation which all countries face together, and it will seek to draw together the several sets of research conclusions into an over-all synthesis as a basis for policy recommendations. The project will be managed by an international steering group of Americans, Japanese, Europeans, and a representative of the developing countries. The Sloan Foundation agreed to provide \$500,000, half the estimated cost of the project, over a period of three years.

Advanced Training in Economics

- Since 1920 the National Bureau of Economic Research has met the need for objective determination of economic facts and their impartial presentation in a way which has earned it the respect of professional economists of all persuasions. Along with its research activities the Bureau offers opportunities

for additional training to a few young postdoctoral economists each year through a program of Faculty Research Fellowships. The fellowship allows the recipient to devote full time to research for about a year, with access to Bureau facilities and in association with members of the staff who are experienced in empirical research.

Recently the Bureau has been receiving so many fellowship applications from young economists whose qualifications, research interests, and support from references are unusually strong that it becomes extremely difficult to select only two or three. The Bureau therefore began to look for outside support to enable it to take advantage of this unusual opportunity and to effect a modest expansion of the program. The Foundation responded with a grant of \$75,000.

Economics of Higher Education

In its general concern for higher education, the Foundation from time to time has made grants intended to shed light on how higher education is financed and how its costs might be borne more equitably. A recent tabulation showed that in the six years 1970 through 1975 the Foundation has granted more than \$900,000 for such purposes.

- A study of the outcomes of higher education that promises to be of more than ordinary interest is being conducted by Dr. Howard Bowen, who retired in 1974 as chancellor of Claremont University Center. Dr. Bowen, an economist who is now R. Stanton Avery professor of economics and education at the Claremont Graduate School, is seeking to assess the value of higher education to society and to the individual, with a view to answering the question: Is higher education worth what it costs? He expects to complete his study in 1976.

The Sloan Foundation extended initial support of \$59,000 for the Bowen study in 1974; support was renewed at \$60,000 for 1975, in a grant paid to Claremont University Center.

Other grants in 1975 for economics and management:

American Economic Association, Nashville, Tenn.	\$20,000
For a summer program to increase the number and educational opportunities of minority students in economics.	
Boston University, Boston, Mass.	\$20,000
For development of teaching materials in public management as a concentration within the Master of Business Administration program of the University's School of Management.	
Dartmouth College, Hanover, N. H.	\$20,000
For support of a departmental evaluation and conferences on the Teaching of Economics in the Undergraduate College.	
Fordham University, New York, N.Y.	\$19,000
For a graduate program to train financial economists.	
National Affairs, Inc., New York, N.Y.	\$20,000
For preparation of articles on economic planning for a special issue of <i>The Public Interest</i> .	

Science and Technology

Science and technology have occupied a central place in the Sloan Foundation's concerns for most of its history. Over a seven-year period extending through 1974, commitments for research and education in basic science and engineering accounted for half of the Foundation's grant making. If to that are added other commitments for medical education (virtually all for minorities), cancer research, and developments in educational technology, the proportion approaches three quarters of the \$93 million granted in that period.

Scientific research has long been under a certain amount of pressure to demonstrate its usefulness, or "relevance" as it is now called, to the society which supports it. As perceived needs arise and become paramount in the public mind, emphasis in research support shifts from aerospace in one period to environmental problems in the next, then to energy problems and so on. The Sloan Foundation has directed its attention to the support of fundamental, basic research (which is always in danger of being neglected) rather than research which happens to be "relevant" in any particular year.

Along with its concern for the vitality of basic science, the Foundation has been interested in the education of those who make use of scientific findings in the economic, social, and political context of today's technological decision making. This has led to relatively heavy investments in engineering education and, more broadly, to grants for training those persons who will be responsible for making and implementing policy in governmental, business, and institutional settings. Some of this activity is properly regarded as management, and is discussed in the section of this Report on that subject. Programs which proceed from a predominantly scientific and technological base will be reported here.

Science and Technology in Relation To Society and Public Policy

- The Polytechnic Institute of New York is a major new private institution created in 1973 through the merger of the Polytechnic Institute of Brooklyn and the School of Engineering and Science of New York University. It has the largest engineering enrollment in New York State, the largest graduate engineering enrollment in the nation, and the largest total engineering enrollment of any private engineering institution in the country.

One of PINY's first priorities is the establishment of a School of Technology Management and Policy Studies, to train technology managers for both government and industry, including managerial and analytic work in the interrelations between the public and private sectors. Programs will be initiated at the Master's and Ph.D. levels, to train engineers to work as professional managers or public policy analysts, and to educate persons interested in research and teaching in this field. Some undergraduate courses will be developed in the managerial, economic, social, and political aspects of technology for students majoring in engineering or science.

Much of the program of the new School can be assembled from existing courses and programs in various fields of science, engineering, and related social sciences. PINY requested Sloan support principally to fill in some gaps in faculty and to integrate the many separate existing efforts into a unified program. A two-year grant of \$350,000 was approved.

- Clark University established in 1973 with Sloan assistance a program called Technology and Man. Its purpose was to provide a setting for interdisciplinary instruction and research on the interaction between science and society. The program has developed several popular new courses and has led to rapid growth in interdisciplinary faculty research, assisted by students. It has attracted substantial other support to the University for interdisciplinary research projects.

In the second phase of the program, now renamed Science, Technology, and Society, Clark proposes to continue course development and revision, to introduce a Master's degree in this subject, and to establish a system of student internships in local and state government and industry. It also intends to broaden the program from its current emphasis on physics and geography to include greater inputs from chemistry, economics, and possibly biology. Through a cooperative arrangement with Worcester Polytechnic Institute, elements of engineering and technology will be integrated into the program. To support these developments the Foundation made a grant of \$140,000, payable over a three-year period, to which Clark will add a somewhat larger amount of its own funds.

- At the University of California, Santa Cruz, Dr. George S. Hammond, the vice chancellor, is organizing a lecture-seminar series dealing with science



"International Interactions in Science and Technology," a nine-week seminar program, brings to the University of California, Santa Cruz, an internationally known scholar each week for seminar sessions and a public lecture. Dr. Derek de Solla Price of Yale University is the guest lecturer facing this class in the University's Merrill College.

and technology in international affairs. As foreign secretary of the National Academy of Sciences, Dr. Hammond is in contact with many distinguished scientists and technologists who can be brought to the Santa Cruz campus to discuss the international aspects of their disciplines and the related implications for domestic policy. The series will be offered both for students interested in careers in this field, and for those interested primarily in furthering their general education. A public lecture series also will be offered. A two-year Sloan grant of \$35,000 is supporting these activities.

- A grant for expansion of a leading public policy program at Duke University, with emphasis on management and engineering, is discussed in the section of this report on Economics and Management.

Traditional Interests

The Sloan Foundation's commitment to basic scientific research extends back in time for twenty years or, if one includes its early support of the Sloan-Kettering Institute for Cancer Research, for thirty years. It is a period which has spanned the rapid growth of federal support for science in the late 1950s and early 1960s, and the slow but steady erosion of such support (in constant dollars) which set in around 1967. Some consequences of this attrition are becoming evident, such as a decline in the proportion of young faculty members

in academic science and engineering departments, from 39 per cent in 1968 to 28 per cent in 1974. Frederick Seitz, who cited these figures, comments that many brilliant potential young scientists are being diverted into such fields as law or medicine, and adds: "In short, we seem to be placing much too low a priority on training young scientists and supporting them during the initial phases of their professional work . . . our present course imposes a stiff mortgage on the future."^{*}

Another spokesman for science, William D. McElroy, states: "The central, critical core of modern science is the body of work known as nondirected, basic research. In reality the 'health' of a nation's science effort is a function of the quality of basic research being done. It is incumbent on those responsible for the nation's well-being to provide adequate support for research of high quality. In turn, scientists carry the burden of educating decision-makers as to the critical importance of basic research."^{**}

In today's circumstances it becomes critically important, as Dr. Seitz states, that private funding be available to enable outstanding young scientists to get started in their research, and to ensure that some research which is unlikely to receive federal support is conducted by persons capable of attacking frontier problems. Those are among the purposes of the Sloan Fellowships for Basic Research.

• The Sloan Fellowships for Basic Research, first awarded in 1955, have assisted 1,220 young scientists, currently averaging 30 years of age, at an aggregate outlay of nearly \$25 million. The program's current funding level is \$1,550,000 a year, which might be considered modest, but the fellowships are perceived by their recipients, destined in most instances to be leaders in their fields, as critically important during the early years of their research careers. The grants, which average about \$17,500 for a two-year period, permit an element of flexibility in the young scientists' research at a time in their careers when this kind of support is particularly difficult to enlist. Fellowships are awarded only in the physical sciences (chemistry, physics, and mathematics) and, since 1972, in neuroscience.

In 1975 a statistical analysis of the fellowship program's last eleven years, from 1965 through 1975, was conducted. During this period some \$15,492,000 had been expended. The results of the analysis, while hardly surprising, afford a general picture of how the program has operated over the past eleven years.

—Types of recipient institutions: Grants were almost evenly divided between public and private universities, 48.6 per cent of the dollar total being

^{*}From remarks to the Council for the Advancement of Science Writing, Ann Arbor, Michigan, November 12, 1975. Dr. Seitz is president of Rockefeller University.

^{**}*Science*, October 3, 1975. Dr. McElroy is chancellor of the University of California, San Diego.

awarded to private universities and 49.6 per cent to public universities. Private colleges received 1.2 per cent, and the small remainder went to other types of institutions.

—Grants by field of science: Chemistry received the largest share over the eleven-year period, 39.8 per cent, followed by physics, 35.9 per cent, and mathematics, 20.5 per cent. During the four years in which neuroscience has been included in the program, neuroscientists received 10.2 per cent of the fellowship funds.

—Geographical distribution of grants: As expected, grants were concentrated in regions where academic scientists are concentrated. Thus the three West Coast states received 23.6 per cent, the Midwest 20.6 per cent, the Mid-Atlantic region 19.0 per cent, and New England 16.1 per cent. Scientists in the Southeast were awarded 5.5 per cent of the total, and the Plains and Rocky Mountain regions both received slightly over 3 per cent. Canadian scientists, who are eligible for Sloan Fellowships, were awarded 3.3 per cent of the total.

The Sloan Fellowships are awarded only to regular faculty members of universities or colleges in the United States or Canada, except in neuroscience, where postdoctoral fellows with at least one year of postdoctoral experience are eligible. Nominations, some 500 annually, are submitted by senior scientists, and from this number about 75 fellowships are awarded each year. The process of selection is carried out by a Program Committee of eight distinguished scientists, two from each of the four disciplines involved. The present members of this committee are:

Dr. Mark Kac, Professor of Mathematics,
Rockefeller University, Chairman.

Dr. Arthur L. Schawlow,
Professor of Physics,
Stanford University.

Dr. Richard B. Bernstein,
Professor of Chemistry,
University of Texas.

Dr. Francis O. Schmitt,
Chairman, Neurosciences Research
Program, Massachusetts Institute of
Technology.

Dr. T. D. Lee, Professor of Physics,
Columbia University.

Dr. I. M. Singer, Professor of Mathematics,
Massachusetts Institute of Technology.

Dr. Carl Pfaffmann, Professor and
Vice President, Rockefeller University,
a neuroscientist.

Dr. Gilbert Stork, Professor of Chemistry,
Columbia University.

Scientists who received Sloan Research Fellowships in 1975 are listed below, by institution and field of science.

Boston University
Chemistry: Dan Dill

California Institute of Technology
Chemistry: Robert M. Stroud
Physics: Glennys R. Farrar, Arnold J. Sierk

University of California, Berkeley
Mathematics: John B. Wagoner

University of California, Davis
Neuroscience: Brian Mulloney

University of California, Irvine
Chemistry: Larry E. Overman

University of California, Los Angeles
Mathematics: Robert D. Edwards,
Robert E. Greene

University of California, San Diego
Chemistry: Jeffrey L. Bada
Physics: Oscar J. Lumpkin, Jr.

University of California, Santa Barbara
Physics: Paul K. Hansma

Carnegie-Mellon University
Chemistry: Patrick M. McCurry, Jr.

Case Western Reserve University
Chemistry: Leonard M. Stephenson

University of Chicago
Physics: Michael S. Isaacson,
Stuart A. Solin

Clarkson College of Technology
Mathematics: Mark J. Ablowitz

University of Colorado
Chemistry: James T. Hynes
Mathematics: Richard A. Holley

Columbia University
Physics: Bruce C. Knapp,
Christopher H. Scholz

Cornell University
Physics: Peter J. Gierasch,
Saul A. Teukolsky

Cornell University Medical College
Neuroscience: Tong H. Joh

Florida State University
Chemistry: George C. Levy

University of Florida
Neuroscience: Adrian J. Dunn

Fordham University
Chemistry: Steven M. Weinreb

Harvard University
Physics: Marc Davis, Alan H. Luther
Neuroscience: Lloyd A. Greene,
Simon LeVay

University of Hawaii
Chemistry: Charles S. Fadley

University of Illinois, Chicago Circle
Chemistry: David G. Gorenstein

University of Illinois, Urbana-Champaign
Mathematics: William Abikoff

Johns Hopkins University
Mathematics: Roger A. Horn

Kansas State University
Chemistry: Darryl D. DesMarreau

Louisiana State University
Chemistry: Kendall N. Houk

Marine Biological Laboratory
Neuroscience: Alan Fein

Massachusetts Institute of Technology
Chemistry: Robert W. Field,
Sidney M. Hecht, Christopher Walsh
Mathematics: David G. Schaeffer
Neuroscience: Loy D. Lytle
Physics: Tanya M. Atwater,
Robert L. Jaffe, Peter Molnar

Michigan State University
Chemistry: Michael W. Rathke

University of Michigan
Mathematics: Spencer J. Bloch

University of Minnesota
Chemistry: W. Ronald Gentry
Physics: Kris Davidson

University of Nebraska, Lincoln
Physics: Anthony F. Starace

**City College of the
City University of New York**
Physics: Robert R. Alfano

**Queens College of the
City University of New York**
Chemistry: Gerald W. Koeppel

State University of New York, Albany
Neuroscience: Helmut V. B. Hirsch

State University of New York, Stony Brook
Mathematics: Michael J. Cowen

University of North Carolina, Chapel Hill
Chemistry: Thomas J. Meyer

Northeastern University
Mathematics: Nancy J. Kopell

Northwestern University
Chemistry: Frederick D. Lewis

Ohio State University
Mathematics: Richard M. Wilson

University of Oregon
Chemistry: Frederick W. Dahlquist

University of Pennsylvania
Neuroscience: Larry A. Palmer
Physics: Tom Lubensky

University of Pittsburgh
Chemistry: Peter E. Siska

Princeton University
Chemistry: Herschel Rabitz
Mathematics: Peter B. Gilkey,
Kenneth A. Ribet

Purdue University
Mathematics: Lawrence G. Brown

Rice University
Chemistry: Paul S. Engel

Rockefeller University
Chemistry: George N. Reeke, Jr.
Neuroscience: Jonathan Winson

Rutgers University
Chemistry: Wilma A. K. Olson

University of Southern California
Physics: Marc D. Levenson

Stanford University
Chemistry: Bruce S. Hudson
Mathematics: Per Enflo, Leon Simon
Physics: Robin P. Giffard, Clifford M. Will

University of Texas, Austin
Physics: C. Wendell Horton, Jr.

University of Texas, Dallas
Physics: Stephen M. Curry

University of Toronto
Physics: Lon M. Rosen

University of Utah
Chemistry: C. Dale Poulter

University of Western Ontario
Chemistry: J. Peter Guthrie

University of Wisconsin
Chemistry: Michael J. Berry, Hans J. Reich

Yale University
Mathematics: James G. Arthur
Physics: Beatrice Tinsley

• The Sloan-Kettering Institute for Cancer Research, established in 1945 upon the initiative of Alfred P. Sloan, Jr., represented the Foundation's first major contribution to the sciences, and today it is the only recipient of Foundation support for medical research. The work of the Institute is in fact basic biological research which aims through a variety of approaches at unlocking the mysteries of cancerous cells. Over the years the Foundation has contributed some \$14.9 million to the support of research at the Sloan-Kettering Institute. Of that amount, \$200,000 was granted in 1975, supplementing a payment of \$400,000 previously committed.

• The Courant Institute of Mathematical Sciences at New York University has enlisted the Foundation's interest since 1961, when Mr. Sloan and the



The Courant Institute of Mathematical Sciences of New York University offers outstanding young professors an opportunity to teach and conduct research in collaboration with leading mathematicians through its Courant Instructorship Program. Dr. Gregory Kriegsmann, a Courant Instructor from the University of California, Los Angeles, discusses a computation with Prof. Peter Lax, director of the Institute.

Foundation were instrumental in obtaining for the Institute its present modern facilities. Courant is a research institute which also serves as the University's graduate mathematics department. Its research and instruction emphasize the applications of mathematics to problems in the other sciences and in industry, and to computer science.

The Foundation last contributed to the Courant Institute in 1972, when a grant of \$300,000 was made to assist the Institute through a period of financial crisis in the parent University. That crisis has been largely surmounted, but by late 1974 funding remained insecure for several programs which the Institute considered to be of great value. These were a Visiting Membership program which brings talented scientists from academic and industrial backgrounds to participate in the Institute for a year while doing advanced work on a wide range of problems; a Courant Instructorships program through which young scientists with new Ph.D.'s are in residence for two-year periods with some teaching duties; and a new Industrial Internship program which exchanges selected graduate students with junior scientists from industrial laboratories.

For these purposes the Foundation in 1975 approved a two-year grant of \$300,000 to New York University, bringing its cumulative support of the Courant Institute to \$4,318,500.

New Research Projects

- Carnegie-Mellon University has had for twenty years, under Dr. Herbert Simon, one of the leading research groups in the field of human information processing. The rise of the computer and other technological advances have led to new conceptual tools and methodologies which help to explain how human beings learn, solve problems, understand language, perceive visual forms, and store memories. Many of these cognitive functions can now be understood, to varying degrees of accuracy and completeness, in terms of the basic information processes that the central nervous system must carry out in order to execute them.

The Carnegie-Mellon group believes that it is now time to test the applicability of this body of theoretical knowledge to concrete problems, in this case the problems of education. They have identified five areas of research in which significant advances now seem possible, such as the teaching of problem solving and the use of computer-generated problems for individually paced courses, in which some pilot work has been done. The hope is for a more efficient educational process based upon new insights into how persons learn. The Foundation made a two-year grant of \$200,000 for this research.

- At the University of California, Los Angeles, a Nobel laureate, Prof. Julian Schwinger, is engaged in a reexamination of some of the fundamental problems of theoretical physics which so far have hampered the development of a fully persuasive quantum mechanics. To do so, he has developed a set of approaches to the problem which he calls "source theory," which has not gained general acceptance among his peers in theoretical physics, most of whom are following other and more conventional lines of approach to the same general problem.

Because of the unconventional nature of his work, Dr. Schwinger's federal support has been sharply reduced, even though many physicists of similar stature strongly urge that his unorthodox pursuit of the problem be continued. Several valuable younger associates would be lost to the project if the federal funds were not somehow replaced. The Foundation agreed to provide \$125,000 over a three-year period to help sustain Dr. Schwinger's research.

- From an appropriation of \$100,000 approved in 1974, \$60,000 was paid in 1975 to Education Development Center for script development for a projected educational television series on the development of American technology, entitled "The Shapes Arise!". It is expected to find additional educational use in the secondary schools.

Other 1975 grants for science and technology:

American Association for the Advancement of Science, Washington, D.C.	\$20,000
To support the planning of a program of science, technology, and public policy activities.	
Center for Short-Lived Phenomena, Cambridge, Mass.	\$20,000
To support transition from federally funded to private status.	

Cornell University, Ithaca, N.Y.	\$5,000
For partial support of a symposium on cognitive and biological aspects of language.	
For partial support of work by student research assistants at the Jet Propulsion Laboratory in connection with the Viking orbiter/lander program.	\$20,000
Franklin Institute, Philadelphia, Pa.	\$10,000
For publication of proceedings of the second Franklin Conference, "Science Policies for the Decade Ahead".	
University of Georgia, Athens, Ga.	\$20,000
In support of a mathematical research program under Professor George Adomian.	
Illinois Institute of Technology, Chicago, Ill.	\$20,000
For partial support of long-range planning by the Commission on the Future of IIT.	
Iowa State University, Ames, Iowa	\$15,375
For partial support of a conference conducted by the Committee on Undergraduate Education of the History of Science Society.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$8,400
For an analysis of computer data to provide a profile of women scientists and engineers holding the doctoral degree.	
For a program to enhance understanding by secondary school personnel of work in science and technology.	\$20,000
For a pilot study in biolinguistics.	\$20,000
For supplemental support of a historical study of the Office of Naval Research.	\$8,400
University of Massachusetts, Boston, Mass.	\$2,000
For partial support of the development of a mathematical model for the restoration of strip-mined land.	
State University of New York, Stony Brook, N.Y.	\$14,650
For development of a curriculum in societal mathematics.	
Rutgers University, New Brunswick, N. J.	\$5,600
To support educational and editorial research in the publication and implementation of the journal <i>Adventures in Experimental Physics</i> .	
Texas Christian University, Fort Worth, Texas	\$7,000
For partial support of printing and distribution of the proceedings of a conference on Computers in the Undergraduate Curricula.	
Tufts University, Medford, Mass.	\$11,800
For development of a computer simulation of the University's heating system.	
Tulane University, New Orleans, La.	\$19,553
In support of a Mathematics Reinforcement and Enrichment Program for Black undergraduates.	
Wellesley College, Wellesley, Mass.	\$20,000
For development of a pilot program in mathematics for students having poor motivation or preparation.	
University of Wisconsin, Milwaukee, Wis.	\$20,000
For support of participation by engineering faculty and students in a Cultural and Technological Studies Program.	

Related Problems of Society

While the bulk of the Foundation's grant support is concentrated in the sharply delimited areas discussed earlier in this Report, the Foundation retains the flexibility to respond to occasional requests in related fields. Some of these grants are exploratory and "seed" grants which may lead in time to the definition of new program interests. Others are made in recognition of the Foundation's civic responsibilities as a corporate citizen of the Greater New York area. The Foundation also contributes to support of the key organizations in its own professional field, which is philanthropy.

Studies in Higher Education Policy

- The American Council on Education, principal voice for higher education in Washington, operates a Policy Analysis Service (PAS) which collects and analyzes information relevant to issues of educational policy. The PAS staff develops the implications of various policy options and disseminates its findings for the assistance of government and institutional officers responsible for making decisions about the complex problems confronting higher education. PAS studies have dealt with such subjects as tuition levels at public institutions, the impact of inflation on higher education, effects of federal student assistance programs and their possible revision, factors affecting the movement of students into and between various kinds of institutions, and many others.

In seeking to expand the range of PAS services to educational policy makers, the American Council on Education has turned to outside funding sources for part of the cost. The Sloan Foundation in 1975 agreed to provide \$150,000 over a three-year period for this purpose.

Public Information About Foundations

• The public's desire for factual information about foundation's activities, and the foundations' own need for a common meeting place and an authoritative spokesman, are served by two separate but allied organizations, the Foundation Center and the Council on Foundations. The Foundation Center maintains libraries of foundation materials and a computerized data system through which information sought by the public, government agencies, and individual foundations may be readily obtained. It also operates programs of research and publications. Its support comes from foundations and, to a lesser degree, from fees paid by users of its services. The Council on Foundations disseminates information of interest to its 750 member foundations, publishes the journal *Foundation News*, conducts an annual conference and various regional meetings, and maintains liaison with government officers and legislators on matters affecting foundations.

A three-year Sloan grant to the Foundation Center expired in 1975, and support was renewed at a level of \$80,000 over two years to help to assure continuation and expansion of the Center's essential services. The Council on Foundations in 1975 received renewed support of \$40,000 over two years for its Public Affairs and Education Program, designed to lead to a broader understanding of philanthropic foundations by the public and its representatives in government. The Sloan Foundation also renewed its annual membership support of the Council through a grant of \$10,000.

These other grants were devoted to higher education, New York-area interests, and national interests:

Antioch College, Yellow Springs, Ohio **\$20,000**
For partial support of a presidential task group to improve the management of the College.

Aspen Institute for Humanistic Studies, Aspen, Colorado **\$17,500**
In support of a workshop on arms control problems in the light of recent scientific and technological developments.

Association of American Colleges, Washington, D.C. **\$10,000**
For partial support of a study of the functions of the AAC, the National Council of Independent Colleges and Universities, and other agencies representing private liberal arts education.

Association of American Medical Colleges, Washington, D.C. **\$2,500**
For publication and dissemination of a cooperative study by the AAMC and the Student National Medical Association entitled *Recruitment and Progress of Minority Medical School Entrants, 1970-72*.

College Entrance Examination Board, New York, N.Y. **\$10,000**
For supplemental partial support of a Task Force on Student Aid Problems.

Cornell University, Ithaca, N.Y. **\$10,000**
In partial support of a conference on "Jobs and Economic Development in New York State".

Economic Development Council of New York City, Inc. **\$20,000**
For partial support of a study of New York City's Mitchell-Lama Housing Program.

Institute for Advanced Study, Princeton, N. J. (two grants) **\$22,500**
For support of a conference on "More Equality as a Goal of Public Policy," and for preparation of a transcript of the conference proceedings.

Massachusetts Institute of Technology, Cambridge, Mass. **\$20,000**
In support of a summer study to examine the educational needs of the Federal Communications Commission, and to prepare a report on how those needs might be met.

National Endowment for the Humanities, Washington, D.C. **\$5,000**
For general support of the New York Council for the Humanities.

National Information Bureau, Inc., New York, N.Y. **\$5,000**
Toward the operational expense of the National Information Bureau, Inc., for a five-year period.

Policies and Procedures

The Alfred P. Sloan Foundation is a general-purpose philanthropic foundation established in 1934 by Alfred P. Sloan, Jr., who was for many years the chief executive officer of General Motors Corporation. Mr. Sloan was Chairman of the Foundation until his death in 1966.

The Foundation's basic interests are in science and technology, in economics and management, and in education and problems of society related to those interests. It functions through a General Program and through several Particular Programs, which are designed to focus specified resources on a closely defined problem area for a limited span of time.

The Foundation's program interests do *not* include the creative and performing arts; religion, the humanities, and medical research except for that conducted at the Sloan-Kettering Institute for Cancer Research. International projects are not supported, with rare exceptions, and the Foundation does not normally make grants for endowment, general support, or buildings, or for equipment which is not directly related to a Foundation-supported project. No grants are made directly to individuals.

The Foundation welcomes proposals falling within the above guidelines. Application may be made at any time; except in special programs such as the Sloan Fellowships for Basic Research there are no deadlines and no special application forms. Proposals usually are addressed to the President of the Foundation, and should state: (1) the specific nature of the problem which is to be attacked; (2) the procedure to be employed; (3) the name(s) and qualifications of the person or persons to be responsible for the project; and (4) the expected cost and duration of the project. Often a preliminary letter of inquiry will save time for both the applicant and the Foundation.

A grant application should be accompanied by documents indicating the applicant's tax-exempt status and its classification as either a private foundation or a publicly supported organization.

The Foundation is governed by a 19-member Board of Trustees assisted by a professional staff. Final disposition of all proposals is the responsibility of members of the Board.

Financial Review



Financial Review

In this Report, which marks the centenary of Mr. Alfred P. Sloan, Jr.'s birth, it may be of interest to the reader that, from the inception of the Foundation in 1934 until the end of 1975, grants and appropriations authorized have amounted to \$267 million (including almost \$128 million in grants by the time of Mr. Sloan's death in early 1966). If administration and investment expenses and Federal excise tax accruals are included, cumulative grants and expenses from inception total \$288 million, compared with income of \$231 million. During this same period, net gains on disposals of securities were \$62 million. This record has been made possible through gifts to the Foundation totalling \$182 million (including \$180 million received directly or indirectly from Mr. and Mrs. Alfred P. Sloan, Jr.). Combining the preceding data provides a December 31, 1975 fund balance of \$187 million, which is shown on the Foundation's 1975 year-end balance sheet.

The financial statements and schedules of the Foundation, which have been audited by Haskins & Sells, independent certified public accountants, appear on pages 54 to 69. They include the balance sheet, the statement of income and funds, the statement of changes in financial position, the schedule of administration and investment expenses, the schedule of marketable securities, and the summary and schedule of grants and appropriations.

Investment and other income in 1975 amounted to \$10,367,642, compared with \$12,028,197 in 1974. The decrease of \$1,660,555 was due principally to lower dividend income in 1975. Investment expenses in 1975 totalled \$332,569, of which \$292,279 represented investment counsel fees. Provision for Federal excise tax amounted to \$400,000 in 1975. These deductions from

income totalled \$732,569 in 1975, compared with \$782,340 in 1974.

Net investment income was \$9,635,073 in 1975, compared with net investment income of \$11,245,857 in 1974.

The total of grants and appropriations authorized and administration expenses during 1975 amounted to \$12,467,525, or \$2,832,452 in excess of net investment income of \$9,635,073. Grants and appropriations totalled \$11,381,366 while administration expenses amounted to \$1,086,159. Over the Foundation's forty-one year history, the cumulative excess of grants and expenses over income has amounted to \$56,525,588.

The total of grant and appropriation payments in 1975 was \$12,372,536, compared with \$13,397,895 in 1974. Together with 1975 administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures in 1975 was \$14,257,428, compared with \$15,361,383 in 1974.

A summary of the Foundation's marketable securities at ledger and quoted market value at December 31, 1975 appears on page 58. The market value of these investment assets of \$256,279,808 at December 31, 1975 compared with \$202,159,112 at December 31, 1974.

A summary of grants by major classifications followed by a listing of grants made during 1975 will be found on pages 64 to 69. Grants and appropriations authorized and payments during the year ended December 31, 1975 are summarized in the following table:

Grants and appropriations authorized but not due at January 1, 1975	\$16,578,294
Authorized during 1975	<u>11,381,366</u>
	27,959,660
Payments during 1975	<u>12,372,536</u>
Grants and appropriations authorized but not due at December 31, 1975	<u>\$15,587,124</u>

The Foundation has a contributory retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund which provides for purchase of annuities for employees. Retirement plan expense was \$90,513 and \$84,739 for 1975 and 1974, respectively.

The Internal Revenue Code, as amended by the Tax Reform Act of 1969, imposes an excise tax at the rate of 4% on the net investment income of private foundations. The accompanying financial statements include provision for this tax. No Federal excise tax has been allocated to net gain on disposals of securities added to the principal fund, since the basis for determining gain or loss on disposals of securities under the Act resulted in a net loss for excise tax purposes.

Income from investments credited to the General Motors Dealers Appreciation Fund during 1975, after provision for Federal excise tax, amounted to

\$204,508. A grant of \$200,000 to the Sloan-Kettering Institute for Cancer Research was authorized and applied against this Fund, as set forth on page 41. Grant payments from this Fund during the year 1975 amounted to \$600,000, resulting in grants outstanding and unpaid at the end of 1975 of \$1,200,000.

The net worth of the Foundation at December 31, 1975, based on quoted market values, was divided as follows:

	Total Assets At Market Value	Grants and Appropriations Authorized But Not Due For Payment	Accrued Federal Excise Tax	Fund Balances At Market Value
General Fund	\$251,577,820	\$14,387,124	\$394,182	\$236,796,514
General Motors Dealers Appreciation Fund	5,084,336	1,200,000	8,286	3,876,050
Total	<u>\$256,662,156</u>	<u>\$15,587,124</u>	<u>\$402,468</u>	<u>\$240,672,564</u>

HASKINS & SELLS
CERTIFIED PUBLIC ACCOUNTANTS

TWO BROADWAY
NEW YORK, NEW YORK 10004

AUDITORS' OPINION

Alfred P. Sloan Foundation:

We have examined the balance sheet of Alfred P. Sloan Foundation as of December 31, 1975 and 1974 and the related statements of income and funds and of changes in financial position for the years then ended. Our examination also comprehended the supplemental schedule of administration and investment expenses for the two years ended December 31, 1975 and the supplemental schedules of marketable securities at December 31, 1975 and grants and appropriations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements and supplemental schedules present fairly the financial position of the Foundation at December 31, 1975 and 1974 and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Haskins & Sells

February 2, 1976

Balance Sheet

December 31, 1975 and 1974

	<u>1975</u>	<u>1974</u>
Assets		
Marketable Securities:		
Fixed income securities:		
U.S. Government and agency obligations	\$ 29,387,784	\$ 30,022,045
Other	22,011,230	31,368,830
Total fixed income securities	<u>51,399,014</u>	<u>61,390,875</u>
Common stocks:		
General Motors Corporation	44,493,253	47,865,564
Other common stocks	106,971,514	100,347,292
Total common stocks	<u>151,464,767</u>	<u>148,212,856</u>
Total marketable securities (quoted market: 1975—\$256,279,808; 1974—\$202,159,112)	202,863,781	209,603,731
Cash	382,348	319,559
TOTAL	<u>\$203,246,129</u>	<u>\$209,923,290</u>

Obligations and Funds

Grants and Appropriations Authorized		
But Not Due for Payment	\$ 15,587,124	\$ 16,578,294
Accrued Federal Excise Tax	402,468	468,632
Fund Balances	187,256,537	192,876,364
TOTAL	<u>\$203,246,129</u>	<u>\$209,923,290</u>

Summary of Significant Accounting Policies

The Foundation maintains its accounts on a modified cash basis, which in effect is not materially different from the accrual basis of accounting.

Marketable securities purchased are carried at cost; those received by gift or bequest are carried at quoted market value at date of gift or bequest. Gain or loss on disposal of securities is determined generally on the basis of first-in, first-out cost, but in certain instances the identified certificate basis is used. Net gain or loss on disposals is applied to the principal fund.

Dividend and interest income, and investment expense are recorded on a cash basis. The unrecorded amount of interest and dividends receivable is not material in relation to net assets or fund balances.

Grant appropriations are accrued at the time authorized by the Trustees and the Federal excise tax is accrued in the year to which it relates. There were no significant unpaid administration expenses at either year-end.

Statement of Income and Funds

For the years ended December 31, 1975 and 1974

	<u>1975</u>	<u>1974</u>
INCOME:		
Investment income:		
Dividends	\$ 6,582,696	\$ 8,151,880
Interest	3,755,169	3,837,115
Other	29,777	39,202
	<u>10,367,642</u>	<u>12,028,197</u>
Less:		
Investment expenses	332,569	316,340
Provision for Federal excise tax	400,000	466,000
	<u>732,569</u>	<u>782,340</u>
Net investment income	9,635,073	11,245,857
Grants and expenses:		
Grants and appropriations authorized	11,381,366	14,976,496
Administration expenses	1,086,159	1,101,060
Total	<u>12,467,525</u>	<u>16,077,556</u>
Excess of grants and expenses over income for the year	(2,832,452)	(4,831,699)
Cumulative excess of grants and expenses over income from inception to:		
Beginning of year	(53,693,136)	(48,861,437)
End of year	<u>(56,525,588)</u>	<u>(53,693,136)</u>
PRINCIPAL:		
Balance at beginning of year	246,569,500	245,110,193
Assets received under will	—	3,107
Net gain (loss) on disposals of securities	(2,787,375)	1,456,200
Balance at end of year	<u>243,782,125</u>	<u>246,569,500</u>
FUND BALANCES AT END OF YEAR	<u>\$187,256,537</u>	<u>\$192,876,364</u>

See Summary of Significant Accounting Policies on Page 54.

Statement of Changes in Financial Position

For the years ended December 31, 1975 and 1974

	<u>1975</u>	<u>1974</u>
SOURCE OF FUNDS:		
Investment and other income	\$10,367,642	\$12,028,197
Assets received under will	—	3,107
Net gain (loss) on disposals of securities	<u>(2,787,375)</u>	<u>1,456,200</u>
	<u>7,580,267</u>	<u>13,487,504</u>
APPLICATION OF FUNDS:		
Grant and appropriation payments	12,372,536	13,397,895
Administration expenses	1,086,159	1,101,060
Investment expenses	332,569	316,340
Federal excise taxes paid	<u>466,164</u>	<u>546,088</u>
	<u>14,257,428</u>	<u>15,361,383</u>
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Change in ledger value of investments	(6,739,950)	(1,648,514)
Change in cash balances	<u>62,789</u>	<u>(225,365)</u>
NET CHANGE IN FUNDS	<u>\$(6,677,161)</u>	<u>\$(1,873,879)</u>

See Summary of Significant Accounting Policies on Page 54.

Schedule of Administration and Investment Expenses

For the years ended December 31, 1975 and 1974

	<u>1975</u>	<u>1974</u>
ADMINISTRATION EXPENSES:		
Salaries and employee benefits:		
Salaries	\$ 544,467	\$ 540,046
Employees' retirement plan and other benefits	<u>143,080</u>	<u>138,189</u>
	687,547	678,235
Rent*	198,219	202,870
Program expenses	94,976	116,218
Office expenses and services	92,290	86,855
Reports and publications	25,133	38,587
Auditing and legal	<u>28,284</u>	<u>24,365</u>
Total administration expenses	1,126,449	1,147,130
Less: Allocation of administration expenses applicable to investments	<u>40,290</u>	<u>46,070</u>
Balance of administration expenses applicable to grant making	<u>\$1,086,159</u>	<u>\$1,101,060</u>
INVESTMENT EXPENSES:		
Investment counsel fees	\$ 292,279	\$ 270,270
Allocation of administration expenses applicable to investments	<u>40,290</u>	<u>46,070</u>
Total investment expenses	<u>\$ 332,569</u>	<u>\$ 316,340</u>

*The Foundation occupies office facilities under a lease which expires April 30, 1985 and provides for annual rental payments, including real estate taxes, of approximately \$220,000 for 1976 and subsequent years.

Schedule of

December 31, 1975

SUMMARY	Quoted Market Value		Percent of Total Investment
	Ledger Amount	Amount	
Fixed income securities:			
U.S. Government and agency obligations	\$ 29,387,784	\$ 28,918,330	11.3%
Other	22,011,230	21,323,927	8.3
Total fixed income securities	51,399,014	50,242,257	19.6
Common stocks:			
General Motors Corporation	44,493,253	65,730,878	25.6
Other common stocks	106,971,514	140,306,673	54.8
Total common stocks	151,464,767	206,037,551	80.4
Total marketable securities	\$202,863,781	\$256,279,808	100.0%

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
U.S. Government and Agency Obligations:			
Treasury Notes:			
6.50%—May 15, 1976	\$ 2,000,000	\$ 1,997,945	\$ 2,005,620
6.25%—February 15, 1978	2,500,000	2,509,766	2,478,125
9%—August 15, 1980	1,000,000	1,089,049	1,060,310
8%—May 15, 1982	1,000,000	1,030,000	1,018,750
Federal Home Loan Banks Consolidated Bonds:			
7.20%—May 25, 1976	1,000,000	1,002,031	1,003,750
7.75%—February 25, 1980	1,300,000	1,301,219	1,304,875
Twelve Federal Land Banks Consolidated Bonds:			
7.05%—July 20, 1976	2,700,000	2,602,125	2,706,750
7.50%—July 20, 1977	1,090,000	1,081,485	1,100,900
5.125%—April 20, 1978	500,000	416,250	476,250
7.15%—July 23, 1979	2,000,000	1,934,375	1,977,500
7.30%—October 20, 1982	1,000,000	1,007,500	965,000

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Federal National Mortgage Association Debentures:			
5.20%—January 19, 1977	\$3,000,000	\$ 3,011,250	\$ 2,940,000
7.85%—September 12, 1977	1,000,000	1,004,375	1,012,500
7.85%—June 11, 1979	1,000,000	1,018,438	1,006,250
7.05%—March 10, 1981	1,100,000	1,034,000	1,067,000
7.25%—June 10, 1981	300,000	297,656	292,500
6.65%—June 10, 1982	1,000,000	1,002,500	932,500
6.05%—February 1, 1988	1,000,000	996,250	835,000
7%—March 10, 1992	5,350,000	5,051,570	4,734,750
Total U.S. Government and agency obligations		29,387,784	28,918,330
Other:			
Undivided interest in demand notes:			
Atlantic Richfield Company	605,000	605,000	605,000
General Electric Company	1,233,000	1,233,000	1,233,000
Certificates of deposit:			
Bank of America N.T. & S.A.			
7.70%—April 1, 1976	680,000	680,000	683,067
Bankers Trust Co. New York			
7%—January 5, 1976	548,000	548,000	548,110
Mellon Bank N.A. Pittsburgh			
7%—January 5, 1976	3,000,000	3,000,000	3,000,600
General Motors Acceptance Corporation Debentures:			
5%—September 1, 1980	1,300,000	1,300,000	1,139,125
5%—March 15, 1981	1,500,000	1,492,500	1,320,000

Schedule of

December 31, 1975 (Continued)

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
National Dairy Products Corporation Debentures 3.125%—June 1, 1976	\$ 200,000	\$ 158,664	\$ 196,250
Household Finance Corporation Sinking Fund Debentures 4.625%—January 15, 1977	1,015,000	870,118	974,400
Morgan Guaranty Trust Company of New York Capital Notes 6.375%—April 1, 1978	1,000,000	1,000,000	950,000
Bankers Trust New York Corporation Debentures 6.375%—September 1, 1978	1,000,000	997,500	955,000
General Electric Credit Corporation Notes 7%—February 15, 1979	2,000,000	1,995,000	1,990,000
American Telephone and Telegraph Company Debentures: 4.375%—April 1, 1985 8.75%—May 15, 2000	1,500,000 2,500,000	1,518,210 2,502,188	1,168,125 2,550,000
Aluminum Company of Canada, Limited Sinking Fund Debentures 9.50%—March 1, 1995	1,000,000	1,012,500	943,750
International Paper Company Sinking Fund Debentures 8.85%—March 15, 1995	1,500,000	1,553,750	1,530,000

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Dow Chemical Company Debentures 8.875%—May 1, 2000	\$ 1,500,000	\$ 1,544,800	\$ 1,537,500
Total other		22,011,230	21,323,927
Total fixed income securities		\$51,399,014	\$50,242,257

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Alcon Laboratories, Inc.	51,000	\$ 1,811,451	\$ 1,096,500
Aluminum Company of America	67,200	3,029,497	2,595,600
American Home Products Corporation	67,000	2,455,136	2,236,125
American Telephone and Telegraph Company	30,000	1,595,517	1,526,250
BankAmerica Corporation	36,100	1,633,425	1,534,250
Caterpillar Tractor Co.	50,000	1,489,726	3,487,500
Citicorp	46,000	1,524,025	1,357,000
Coca-Cola Company	27,000	2,165,920	2,220,750
Continental Corporation	25,000	1,084,500	1,093,750
Dow Chemical Company	30,100	1,630,311	2,757,913
Eastman Kodak Company	94,154	2,452,869	9,992,093
Exxon Corporation	54,167	2,636,955	4,807,321
First Bank System, Inc.	40,000	1,891,325	1,640,000
First Chicago Corporation	72,456	753,105	1,313,265
First International Bancshares, Inc.	43,000	1,625,104	1,591,000
General Electric Company	50,000	2,287,451	2,306,250
General Motors Corporation	1,140,666	44,493,253	65,730,878
General Reinsurance Corporation	9,000	1,893,850	1,377,000
Government Employees Life Insurance Company	70,000	2,711,528	1,085,000

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December 31, 1975 (Continued)

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Halliburton Company	15,000	\$ 1,317,432	\$ 2,193,750
Hewlett-Packard Company	15,000	1,414,022	1,417,500
International Business Machines Corporation	83,280	6,008,090	18,675,540
International Flavors & Fragrances Inc.	54,060	1,921,575	1,297,440
Johnson & Johnson	25,000	2,108,770	2,243,750
S. S. Kresge Company	100,000	3,380,177	3,350,000
Eli Lilly and Company	33,000	2,048,917	1,707,750
Lowe's Companies, Inc.	39,600	2,301,650	1,801,800
Lubrizol Corporation	81,500	3,448,553	3,209,063
Marsh & McLennan Companies, Inc.	20,000	954,182	1,165,000
Merck & Co., Inc.	30,000	396,211	2,077,500
Minnesota Mining and Manufacturing Company	24,000	1,331,058	1,332,000
Mobil Oil Corporation	77,000	2,211,643	3,638,250
Monsanto Company	35,000	2,407,950	2,673,125
Moore Corporation Limited	30,000	1,316,375	1,402,500
J. P. Morgan & Co. Incorporated	87,272	1,538,206	4,669,052
J. C. Penney Company, Inc.	24,400	1,775,864	1,223,050
Perkin-Elmer Corporation	56,000	1,326,229	1,141,000
Philip Morris Incorporated	55,000	2,990,861	2,915,000
Procter & Gamble Company	43,000	760,598	3,827,000
Ralston Purina Company	65,000	2,707,620	3,079,375
Revlon, Inc.	19,000	1,341,109	1,429,750
Schering-Plough Corporation	26,000	1,857,586	1,368,250
Jos. Schlitz Brewing Company	54,000	2,141,719	1,032,750
Schlumberger Limited	38,400	935,258	2,918,400
Sears, Roebuck and Co.	63,805	1,494,677	4,115,423
Skaggs Companies, Inc.	97,000	2,236,998	2,910,000
Southeast Banking Corporation	44,000	1,139,144	484,000
Squibb Corporation	51,000	2,305,438	1,695,750
Standard Oil Company (Ohio)	49,000	2,904,130	3,362,625
Sterling Drug Inc.	65,000	1,395,519	1,210,625
Superior Oil Company	10,000	2,593,908	1,635,000

Marketable Securities

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Union Camp Corporation	33,000	\$ 2,204,762	\$ 2,359,500
Union Carbide Corporation	41,300	2,647,509	2,524,463
United States Steel Corporation	41,500	2,622,643	2,697,500
Weyerhaeuser Company	20,000	543,799	742,500
Xerox Corporation	15,000	269,637	763,125
Total common stocks		151,464,767	206,037,551
Total fixed income securities		51,399,014	50,242,257
Total marketable securities		<u>\$202,863,781</u>	<u>\$256,279,808</u>

Summary of

Grants and Appropriations

	Authorized But Not Due December 31, 1974	Changes During 1975		Authorized But Not Due December 31, 1975
		Authorized	Payments	
Sloan Fellowships for Basic Research (164 fellowships at 71 educational institutions)	\$ 2,192,300	\$ 1,558,178	\$ 1,421,986	\$ 2,328,492
College Science Program	31,000	—	31,000	—
Major Grants to colleges and universities	9,048,433	6,272,400	7,402,517	7,918,316
Other Major Grants:				
American Council on Education	—	\$150,000	\$ 50,000	\$ 100,000
Brookings Institution	\$ 50,000	500,000	50,000	500,000
Cold Spring Harbor Laboratory	—	165,000	55,000	110,000
Engineers' Council for Professional Development, Inc.	150,000	190,000	265,000	75,000
Joint Council on Economic Education	54,000	—	54,000	—
Marine Biological Laboratory	—	107,000	54,000	53,000
Memorial Sloan-Kettering Cancer Center	2,000,000	—	500,000	1,500,000
NAACP Legal Defense and Educational Fund, Inc.	60,000	—	40,000	20,000
National Academy of Sciences	75,000	—	75,000	—
National Fund for Minority Engineering Students	—	800,000	200,000	600,000
National Medical Fellowships, Inc.	300,000	—	150,000	150,000
Neurosciences Research Foundation, Incorporated	50,000	—	50,000	—
Salk Institute	—	315,000	200,000	115,000
Sloan-Kettering Institute for Cancer Research	1,600,000	200,000	600,000	1,200,000
Southern Regional Education Board	55,000	—	55,000	—
TOTAL OTHER MAJOR GRANTS	4,394,000	2,427,000	2,398,000	4,423,000
Officer Grants	750,000	749,788	718,788	781,000
Other Grants and Appropriations (none over \$100,000 in 1975)	162,561	374,000	400,245	136,316
TOTAL GRANTS AND APPROPRIATIONS	\$16,578,294	\$11,381,366	\$12,372,536	\$15,587,124

Schedule of

	Authorized But Not Due Dec. 31, 1974	Changes During 1975		Authorized But Not Due Dec. 31, 1975
		Authorized	Payments	
A&T University Foundation, Inc.	\$ 50,000		\$ 50,000	
Adelphi University	46,000		46,000	
Alabama, University of		\$ 20,000	20,000	
American Association for the Advancement of Science		20,000	20,000	
American Council on Education		150,000	50,000	\$ 100,000
American Economic Association		20,000	20,000	
American Society for Engineering Education		5,000	5,000	
Antioch College		20,000	20,000	
Arizona, University of	9,475		9,475	
Aspen Institute for Humanistic Studies		17,500	17,500	
Association of American Colleges		10,000	10,000	
Association of American Medical Colleges		2,500	2,500	
Barnard College	13,570		13,570	
Beloit College	24,800		24,800	
Boston University		36,219	28,110	8,109
Brookings Institution	50,000	500,000	50,000	500,000
Buena Vista College		20,000	20,000	
California, University of	997,670	362,331	793,838	566,163
California Institute of Technology	514,935	56,143	353,007	218,071
California State University Foundation, Northridge		19,827	19,827	
Callier Center for Communication Disorders		20,000	20,000	
Carnegie-Mellon University		216,219	8,110	208,109
Case Western Reserve University	188,855	311,219	151,965	348,109
Center for Short-Lived Phenomena		20,000		20,000
Chicago, University of	25,300	257,350	122,688	159,962
Claremont University Center		60,000	60,000	
Clark University		140,000	57,000	83,000
Clarkson College of Technology		19,223	9,612	9,611
Cold Spring Harbor Laboratory		165,000	55,000	110,000
College Entrance Examination Board		10,000	10,000	
Colorado, University of	4,600	35,442	22,322	17,720
Colorado State University		14,500	14,500	
Columbia University	264,725	258,377	183,140	339,962
Consortium for Graduate Study in Management	150,000		100,000	50,000
Cornell University	257,480	112,224	161,092	208,612
Council on Foundations, Inc.		50,000	30,000	20,000
Dallas County Community College District		11,450	11,450	
Dartmouth College	250,000	20,000	270,000	
Detroit Institute of Technology	25,000		25,000	
Duke University		287,500		287,500

Grants and Appropriations

	Authorized But Not Due Dec. 31, 1974	Changes During 1975		Authorized But Not Due Dec. 31, 1975
		Authorized	Payments	
Economic Development Council of New York City, Inc.		\$ 20,000	\$ 20,000	
Education Development Center, Inc.		99,000	99,000	
Engineers' Council for Professional Development, Inc.	\$ 150,000	190,000	265,000	\$ 75,000
Florida, University of		55,200	46,550	8,650
Florida State University		16,219	8,110	8,109
Fordham University		35,219	27,110	8,109
Foundation Center		80,000	40,000	40,000
Foundation for Advanced Education in the Sciences, Inc.	2,000		2,000	
Franklin Institute		10,000	10,000	
George Washington University	180,000		60,000	120,000
Georgia, University of		20,000	20,000	
Georgia Institute of Technology	10,350	31,100	41,450	
Harvard University	741,133	63,199	475,404	328,928
Hawaii, University of		16,219	8,110	8,109
Houston, University of		44,000	44,000	
Howard University	260,000		155,000	105,000
Illinois, University of	33,925	35,442	51,647	17,720
Illinois Institute of Technology		20,000	20,000	
Institute for Advanced Study	9,200	13,300	22,500	
Iowa State University		5,270	20,645	
Johns Hopkins University		5,060	14,672	9,611
Joint Council on Economic Education	54,000		54,000	
Kansas State University		16,219	8,110	8,109
Kentucky, University of	9,200		9,200	
Lafayette College	50,000		50,000	
Lincoln Center for the Performing Arts, Inc.		19,600	19,600	
Louisiana State University		16,219	8,110	8,109
Marine Biological Laboratory		124,300	62,650	61,650
Marquette University		40,000		40,000
Maryland, University of	10,695		10,695	
Massachusetts, University of	200,000	2,000	102,000	100,000
Massachusetts Institute of Technology	1,066,700	731,866	1,266,035	532,531
Memorial Sloan-Kettering Cancer Center	2,000,000		500,000	1,500,000
Michigan, University of	109,200	20,367	119,956	9,611
Michigan State University	236,625	16,219	80,735	172,109
Minnesota, University of		56,181	38,091	18,090
NAACP Legal Defense and Educational Fund, Inc.	60,000		40,000	20,000
NAACP Special Contribution Fund	25,000		25,000	
National Academy of Sciences	75,000		75,000	
National Affairs, Inc.		20,000	20,000	
National Bureau of Economic Research, Inc.		75,000	40,000	35,000

Schedule of

(Continued)

	Authorized	Changes During 1975		Authorized
	But Not Due Dec. 31, 1974	Authorized	Payments	But Not Due Dec. 31, 1975
National Endowment for the Humanities		\$ 5,000	\$ 5,000	
National Fund for Minority Engineering Students		800,000	200,000	\$ 600,000
National Information Bureau, Inc.		5,000	5,000	
National Medical Fellowships, Inc.	\$ 300,000		150,000	150,000
Nebraska, University of		19,962	9,981	9,981
Neurosciences Research Foundation, Incorporated	50,000		50,000	
New Mexico, University of	330,700		75,000	255,700
New York Institute of Technology	175,000		87,500	87,500
New York University	127,705	300,000	217,705	210,000
North Carolina, University of	386,500	36,219	217,610	205,109
Northeastern University	69,200	19,223	78,812	9,611
Northwestern University	17,250	776,219	435,360	358,109
Ohio State University		19,223	9,612	9,611
Oregon, University of		16,219	8,110	8,109
Pennsylvania, University of	58,900	37,262	77,531	18,631
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)		60,000	60,000	
Pittsburgh, University of	6,900	16,219	15,010	8,109
Polytechnic Institute of New York		350,000		350,000
Prairie View A&M University	50,000		50,000	
Princeton University	377,225	543,865	523,759	397,331
Purdue University	7,290	207,223	16,902	197,611
Research Foundation of The City University of New York	100,000	36,181	68,091	68,090
Research Foundation of State University of New York	140,000	46,523	168,262	18,261
Rice University		16,219	8,110	8,109
Rochester, University of	400,000		200,000	200,000
Rockefeller University	62,500	33,519	79,260	16,759
Rollins College		35,000		35,000
Rutgers University	17,825	21,819	31,535	8,109
Salk Institute		315,000	200,000	115,000
SIAM Institute for Mathematics and Society	29,000		29,000	
Sloan-Kettering Institute for Cancer Research	1,600,000	200,000	600,000	1,200,000
Smith College	31,000		31,000	
Society for Neuroscience		11,680	11,680	
Southern California, University of	8,050	28,717	26,786	9,981
Southern Methodist University		250,000		250,000
Southern Regional Education Board	55,000		55,000	
Southern University and Agricultural and Mechanical College	50,000		50,000	
Spence School		150,000		150,000

Grants and Appropriations

	Authorized	Changes During 1975		Authorized
	But Not Due Dec. 31, 1974	Authorized	Payments	But Not Due Dec. 31, 1975
Stanford University	\$ 284,550	\$ 364,589	\$ 281,846	\$ 367,293
Stony Brook Foundation, Inc.		14,650	14,650	
Swarthmore College	25,000		25,000	
Temple University		10,400	10,400	
Tennessee State University	50,000		50,000	
Texas, University of	3,220	50,924	23,182	30,962
Texas Christian University		7,000	7,000	
Toronto, University of		19,962	9,981	9,981
Tufts University		11,800	11,800	
Tulane University		19,553	19,553	
Tuskegee Institute	50,000		50,000	
Urban League of Cleveland		17,500	17,500	
Utah, University of		16,219	8,110	8,109
UWM Foundation, Inc.		20,000	20,000	
Vanderbilt University	253,050		76,550	176,500
Vassar College	37,000		37,000	
Virginia, University of		254,000	96,000	158,000
Washington, University of	13,455		13,455	
Washington University	175,900	300,000	112,950	362,950
Waterloo, University of	13,800		13,800	
Wayne State University	8,050		8,050	
Wellesley College		20,000	20,000	
Western Institute for Science and Technology		61,000	61,000	
Western Ontario, University of		16,219	8,110	8,109
Wisconsin, University of	27,370	242,438	113,590	156,218
Wisconsin Foundation, University of		20,000	20,000	
Worcester Polytechnic Institute	200,000	85,000	171,000	114,000
Xavier University of Louisiana	54,200		54,200	
Yale University	350,000	260,510	200,918	409,592
York University	8,325		8,325	
Sloan Fellowships for Basic Research to be granted in ensuing year	1,550,000			1,550,000
Officer Grant appropriation for grants in ensuing year	750,000			750,000
Other appropriations for grants and related expenses	108,561	40,000	107,245	41,316
Reduction for Grant Transfers	16,578,294	11,397,547	12,388,717	15,587,124
TOTAL GRANTS AND APPROPRIATIONS	\$16,578,294	\$11,381,366	\$12,372,536	\$15,587,124

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Alfred P. Sloan Foundation, Inc.

It seems perfectly clear that Foundations are certain to take a more significant part in many phases of American society in the future than in the past.

My concept of a Foundation is that its resources should be considered "risk capital," to be employed in furthering projects of potential value in promoting the public welfare—projects to which the profit motive does not apply and for which, therefore, normal financing is unavailable. By so directing their resources, Foundations can and will increasingly become an important force in stimulating higher standards of education, broader concepts of research, and the advancement of both social and economic progress through fundamental investigation and study. In all such areas, needless to say, endless opportunities exist.

Such is the concept that guides the policy of the Alfred P. Sloan Foundation, Inc. The biennial report for 1951-1952 is attached hereto for your information. I hope you will find it constructive and of interest.

ALFRED P. SLOAN, JR.

Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr. (1875-1966)

Report for 1976

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President's Statement



President's Statement

As one who as a university administrator sought foundation support over a period of many years, I can understand why petitioners for such support often react with wry amusement to the statement that a particular foundation's funds are "limited" and that the foundation therefore must establish boundaries, defined as "program," restricting the kinds of activities it supports. The statement is nonetheless true and for the very fact that it is true, it behooves foundations to make as clear as possible the nature of the constraints under which they operate. It is equally important that they indicate well in advance of actual grant making any new program interests they intend to pursue.

The well managed foundation must be aware of and even welcome the tension generated between consistency and change. Programs well conceived and timely in their day may become irrational with the passing of time. On the one hand, foundations must be scrupulous about performing what they have set themselves to perform; on the other hand, they should be constantly aware that the customary must not be permitted to harden into the sacrosanct.

With these general principles in mind the Sloan Foundation defines its program interests as science, technology and engineering, economics and management, and higher education related to those fields. An elaboration of this brief statement can be found in the grants made in 1976 and described in the body of this Report.

During the year the Trustees of the Foundation gave their approval to two modifications in its program, one under what the Foundation has come to call its "General Program" and the other under the rubric of "Particular Programs." The fields represented are, respectively, higher education for public service and the cognitive sciences.

An interest in education for public service has been reflected in indirect ways in the Foundation's program for several years although not made as

explicit as it now will be. This past history is of some relevance and may be of interest to individuals and institutions which share the Foundation's concern.

In 1970 a proposal was received from the Kennedy School of Government at Harvard University seeking support to help create a graduate program in Public Policy. The proposal was not entirely "in program" and not entirely "out of program." The field itself was a new one for higher education, its curriculum an amalgam of pragmatic political science, applied economics, and analytic methods derived in part from post-war developments in operations research and mathematical modeling by way of the computer.

The proposal clearly involved economics and certain specialized applications of science. Yet public policy analysis was well outside the Foundation's ordinary program guidelines. However, the proposal was recommended to the Trustees based on the conviction that it did intersect with several interests of the Foundation although it could not be placed in any single program area. It was clearly related to the Foundation's interests in broadening management education to include preparation for public and not-for-profit enterprises. Its application of more scientific method to policy decision making and its relevance to urban management also touched on other Foundation interests. The Trustees welcomed the proposal and approved it.

Later in that year a proposal was received from the Graduate School of Business at Stanford University, seeking funds with which to plan the development of a "new Master of Business Management program in urban management." This was, to be sure, well within program: management education at a business school. But coming as it did on the heels of the Kennedy grant, it was noted that the Stanford plans were to a large extent much like the Kennedy plans, and that the "urban management" program at one site had elements in common with the "public policy" plans at the other. This proposal was also funded.

In mid-1971, Carnegie-Mellon University approached the Foundation with a proposal that again was partly in and partly outside program. Carnegie-Mellon felt that the engineering education it was providing was not totally responsive to the growing importance of the interaction of engineering practice with explicitly sensed social concerns. The University asked the Foundation for financial assistance in bringing into being a curriculum dealing with the economic, political, and social implications of engineering practice. Not only was a grant made to Carnegie-Mellon, but the Foundation, in 1972, invited more than twenty other schools of engineering to make proposals for the same or similar purposes. By the end of 1974, grants totaling more than \$8 million had been made to twenty-five schools of engineering.

In due course, Carnegie-Mellon came to the conclusion that there was need to develop a program at the doctoral level with the same emphasis and orientation, in part to provide the faculty for its own and for other doctoral

programs, and in part to establish the field itself as a respectable academic engineering sub-discipline.

As the Foundation reviewed the twenty-five grants that had followed upon the original Carnegie-Mellon proposal, it became clear that many of the institutions had in fact instituted programs that could be described as programs in "engineering and public policy." The Stanford program in urban management had meanwhile developed into a program in public management which included the federal and state levels as well as the local level. Other schools of business were following a similar route. The movement toward public policy programs was spreading rapidly through major universities.

All of these programs were designed in one way or another to provide professional preparation for public service. Some of the better schools of public administration were also incorporating aspects of public policy into their academic offerings. Schools of law, which in practice provided so large a portion of the entrants into public service, were beginning to examine their public policy curricula with a view to joint degree arrangements and the provision of some elements of such curricula within the law schools themselves.

Closely related though these various lines of development were, they were in fact proceeding almost in isolation one from the other. In an attempt to reduce that isolation, the Foundation convened in the summer of 1976 a week-long seminar to which were invited representatives of all of these major approaches, represented by schools of public policy, of management, of public administration, of engineering and of law. The seminar was most instructive to the Foundation. At the same time it engendered among the disparate groups a feeling of community that had been largely absent. It stimulated joint efforts among them.

The officers and staff of the Foundation were persuaded that "education for public service" represented a coherent educational undertaking and one to which the Foundation would be justified in offering substantial support. The Trustees approved such a recommendation and grants were made during the last half of 1976. With this Annual Report education for public service formally becomes an element in the Foundation program.

This whole development illustrates how important a degree of flexibility in Foundation program planning is, enabling the Foundation to be responsive to real needs and promising opportunities even when they do not fit neatly Foundation program guidelines. In no small measure the insights developed within the Foundation are brought to it by those whom the Foundation serves. Such receptivity and sensitivity are important hallmarks of the properly managed foundation.

The second significant modification in the Foundation's program is represented by a new Particular Program in the Cognitive Sciences. During 1976 the last two of the original three Particular Programs were terminated, on sched-

ule: the Particular Program in Neuroscience extending over a period of seven years involved the expenditure of more than \$12 million; the Particular Program in Technology in Education expended \$8 million over six years. The Particular Program in Minorities in Engineering, now in the fourth year, continues.

Much of 1976 was spent in planning the new Particular Program in Cognitive Sciences, to be initiated in 1977. It will attempt to encourage a greater degree of multidisciplinary work in such fields as experimental psychology, linguistics, computer science and even neuroscience. Those fields in concert appear to be on the verge of great forward movement, and the investment of \$12 to \$15 million by the Foundation over a five-year period seems well supported by this evidence of promising significant developments.

As is now a regular part of the Foundation's program planning, during 1977 still another Particular Program will be identified to be put in place during 1978. Over time the Foundation commits approximately 60% of its resources to its General Program and 40% to Particular Programs, three of which are usually in operation at any given time.

Trustees of the Foundation acceded with regret to the requests of Edwin D. Etherington and Clifton C. Garvin, Jr., not to stand for reelection to the Board at its annual meeting on May 25, 1976. Mr. Etherington has served as a Trustee since 1969 and Mr. Garvin since 1972. Both will be missed in the years ahead.

January 1977

Wesley

General and Particular Programs

The Foundation's operating concept allocates approximately 60 per cent of its resources to its General Program and 40 per cent to Particular Programs. In the General Program the grant-making operation is much like that of other general-purpose foundations, pursuing the established Sloan interests in science and technology, economics and management, and such other activities as may arise out of those interests. Particular Programs, on the other hand, represent sharply focused efforts in specific problem areas over limited periods of time; typically they involve expenditures of \$10 million to \$15 million over five to seven years.

The Foundation is now at a point in the evolution of its Particular Programs where the first three such programs have run their course and have been phased out. In this category are the former Particular Programs concerned with Minorities in Medicine and Management, Neuroscience, and Technology in Education. At the same time a fourth program, in Minority Engineering Education, is operating at a maximum level and a fifth one, in Cognitive Sciences, has been approved by the Board of Trustees and will begin operation in 1977. During 1977 the officers and staff will be investigating possible subjects for a sixth Particular Program, which would return these programs to their normal complement of three.

Termination of a Particular Program does not signify an end to the Foundation's interest in that area; unusual opportunities can still be considered for support under the General Program. It is also expected that such a program will be sufficiently important to generate interest and support from sources other than the Foundation. For the Foundation the intention is that proposed commitments set aside for highly specific purposes will be redirected periodically into areas of fresh challenge.

General Program



Education for the Public Service

The manner in which the Foundation came to be involved with programs of higher education designed to prepare graduates for careers in the public service has been described in the President's Statement earlier in this Report. As is explained in that statement, such programs have evolved in schools of engineering, in graduate schools of business management, in schools of public administration or public affairs, and in the newer schools more explicitly concerned with public policy formation. There is also movement in the direction of public-service education in some schools of law, which traditionally have prepared many if not most of the nation's political leaders.

Wherever found, most such programs share certain characteristics: their graduates are expected to master statistical and analytic mathematical tools; they must be equipped to assess critically the data of economists, and to understand the intricacies of political science; and they must by some means become familiar with the technological issues that underlie most problems in public management and public policy.

From its base of interests in engineering and management, the Sloan Foundation has expanded its concerns to programs of public-service education in the newer schools grounded in the applied social sciences (but not, thus far, to programs in schools of law). Overall, the Foundation in 1976 granted some \$2.5 million to various kinds of institutions for activities in education for the public service, at levels ranging from undergraduate to doctoral training. As will be seen in the descriptions which follow, the programs go by many different names and proceed from different academic bases or combinations of bases; their discussion under one or another disciplinary rubric is in some instances purely a matter of convenience.

Engineering-Based Programs

- A 1971 grant to Carnegie-Mellon University was an early step by the Foundation into the field of education for the public service, although that was only dimly apparent at the time. Following the first grant to Carnegie-Mellon, for a new undergraduate Program in Engineering and Public Affairs, there was a series of major grants to other institutions, all for the general purpose of introducing engineering students to the complex social, economic, and political issues which must be confronted in attacking today's engineering problems. Twenty-five grants for this purpose, amounting to \$8 million, were awarded over a five-year period.

Engineering and Public Affairs, renamed Engineering and Public Policy, is now fully established at Carnegie-Mellon; program enrollment is close to 100 undergraduates, and its earlier students are pursuing careers in engineering, business, and government. In 1976 Carnegie-Mellon proposed to take a further step: the creation of a graduate program in Engineering and Public Policy leading to the Ph.D. in that field with, optionally, a concurrent M.S. in one of the traditional engineering departments.

The new graduate program, apart from supplying new faculty to teach the analytical and problem-solving techniques demanded by our increasingly technological society, is expected to contribute to the growth of technology and public policy as a recognized discipline in its own right. Research to develop the generalizable insights and methodological tools of a new profession can be conducted only at the graduate and postdoctoral levels; a demonstrated record of accomplishment at those levels is a prerequisite to academic recognition of a new discipline. To assist Carnegie-Mellon in moving toward this goal, a three-year grant of \$350,000 was approved in 1976.

- At Massachusetts Institute of Technology a new program offering the master's degree in Technology and Policy began in the fall of 1976 with renewed Sloan support. The program concentrates on problems that relate primarily to the operation of complex industrial and public systems. It offers an opportunity for interaction between faculty and students from separate discipline-oriented departments, providing a stimulus for examining problems in such areas as technology and health care, technology and legal systems, and so on. The engineering departments and the schools of Management, Architecture and Planning, and Humanities and Social Sciences are represented on the steering committee for the Technology and Policy program. Sloan support will be used mainly for curriculum development.

Two M.I.T. research centers which contribute to the breadth of education of M.I.T. engineering students received renewed support under the same grant. The Center for Policy Alternatives, established four years ago, has developed a broad-scale research program which examines the major technology-related issues facing society, assesses the consequences of current prac-



Members of a student task force at Carnegie-Mellon University who studied residential power load management present their findings to an audience which includes public utility representatives and regulators. Task forces are part of the University's Engineering and Public Policy program. Presentation is being videotaped for preservation and analysis.

tices and policies, and identifies the possible alternative courses of action. The Center for International Studies engages in research on the social and technological issues involved in such areas as energy, environment, oceans, communications, arms control and defense, nutrition, planning for development, and science and technology policy. In both centers students are involved in some of the research, and some new courses have emerged from the research collaboration of social scientists and engineers.

For the master's degree program in Technology and Policy, and for administrative and development costs of the two M.I.T. centers, the Foundation made a three-year grant of \$655,000 in 1976.

- A separate grant to M.I.T. will support the creation of an undergraduate program in public policy. It will be administered by the Department of Political Science in cooperation with numerous other departments and schools of the Institute. The aim is to afford M.I.T. undergraduates, who tend to be quite sophisticated about science and technology, an understanding of how political, economic, and social decisions evolve, and to respond to "their growing realization and puzzlement that society does not simply adopt and efficiently implement courses of action that 'experts' (such as they are striving to become) deem rational."

M.I.T. students may take a major in public policy, serving internships and preparing theses, but it is expected that most will select public policy as an area for a required non-science concentration or will take a few courses to gain some insight into policy formation. The objective is to equip them to search out and appraise evidence from a wide variety of sources, to think critically about policy issues and the claims made on behalf of policy proposals, and to make sophisticated use of key theories, findings, and analytic approaches that have proven useful in the study of policy formation, implementation, and evaluation.

For the M.I.T. undergraduate program the Foundation is providing \$250,000 over two years, much of it to allow faculty members time to develop the new courses and teaching materials which are sorely needed at this point in the development of education for the public service.

Management-Based Programs

- Since 1971 Stanford University has conducted a Public Management Program in its Graduate School of Business. Public management training is offered as an option within the regular two-year Master of Business Administration program; originally the program was focused on urban management, but in 1973 it was broadened to provide training for all levels of government. By 1976 the program had 93 graduates, nearly all of whom had gone into jobs in the public sector, the federal government being the largest employer with 33. Most of the students had had full-time experience in government or other non-profit positions before joining the Stanford program; this experience is augmented by a summer internship with an appropriate agency or organization, and by field projects conducted with government agencies in the region.

By 1976 the Graduate School of Business was ready to propose a series of improvements to enable the Public Management Program to realize its full potential. It proposed to add new courses and develop new public-sector teaching materials, expand the number of joint research projects involving the School and governmental agencies, and increase the number of local governmental officials visiting the School as speakers. The Foundation responded with renewed support of \$500,000 over three years.



A public management seminar in Stanford University's Graduate School of Business is led by Alain C. Enthoven, who is Marriner S. Eccles Professor of Public and Private Management. Most students in the program have had previous experience in government.

- Yale University's newest professional school, the School of Organization and Management, admitted its first class of 50 students in the Fall of 1976. The School is attempting a unique synthesis of the educational approaches commonly employed in business schools, public policy schools, and schools of public administration. The intention is to design a program which integrates into a coherent two-year course of study the tools and perspectives of management, policy analysis, and operations within a political environment, producing managers who will be at home in public, private, and nonprofit contexts. In this effort there are few existing materials to fall back on, so much of the early work will be in the development of case studies appropriate to such a mixed program. These cases will serve to expose students to problems of increasing complexity as they proceed through the core curriculum, a central two-year workshop, and "clinical" seminars and internship programs.

Principally for this curriculum development work by faculty members, the Foundation granted \$250,000, payable over two years, to Yale's new School.

Public Policy-Based Programs

As education for the public service takes shape as a distinct professional field, in its various settings, the need for case studies and course materials that

are generally useful, as a textbook is generally useful, becomes more pressing. Cases which illustrate in depth real problems faced by practicing managers are expensive and time-consuming to develop, and often do not work well outside the institutions where they originated. Several schools of public policy studies are working to remedy this situation.

- Faculty and graduate students at Harvard University and the State University of New York at Stony Brook are collaborating in preparing case materials in public management with the help of Sloan grants to both universities. The participating entities are Harvard's John Fitzgerald Kennedy School of Government and the W. Averell Harriman College for Urban and Policy Sciences at Stony Brook. The Kennedy School has taken a leading position, partly through past Sloan support, in preparing case studies for use in public policy education; the Stony Brook school will profit from this experience while helping the Kennedy School learn how to make its case materials more readily usable at other institutions. The hope is that materials suitable for broad dissemination to comparable programs will emerge.

For the Harvard-Stony Brook collaboration the Foundation granted \$100,000 over two years to Harvard University and the same amount to the Stony Brook institution, the latter grant payable to the Research Foundation of State University of New York.

- The role of technology in education for the public service appears to require more emphasis than it currently receives in most educational programs of the kind under discussion here. The policy maker is repeatedly faced with technological issues—such as the relative emphases to be placed on nuclear and fossil energy—in which the customary recourse is to turn to experts for advice. But this practice abdicates responsibility for policy making to the experts, to some degree, and the policy maker could deal more intelligently with experts if he himself had some capacity to conceptualize and analyze technical information.

A three-university task force intends to tackle the problem of designing a course or courses which deal with technological processes themselves rather than with the economic, legal, organizational, or political aspects of technology. Technology is coming to be recognized as an independent force in public affairs, and public managers, this reasoning goes, must be able to think analytically and critically about it.

To develop the needed graduate course material in this area, Syracuse University's Maxwell School of Citizenship and Public Affairs will form a task force with the Graduate School of Public Administration of New York University and the Harriman College for Urban and Policy Sciences at the State University of New York at Stony Brook. The work will be supported by a two-year Sloan grant of \$150,000 to Syracuse University.

Related Activities

- The American Association for the Advancement of Science (AAAS), with some 300 affiliated scientific, engineering, and professional societies, represents perhaps the broadest and most diverse constituency of persons interested in science in academia, industry, and government. It is now preparing to play a larger role in stimulating a public dialogue on the place of science and technology in shaping public policy. Assisted by a 1975 Sloan planning grant, the AAAS has formulated a three-part program which includes preparation of a regular series of papers on science and technology policy issues, for use as a basis for discussion in various forums including an annual mid-year science policy meeting; encouraging the growth and coherence of university-based research and teaching in science, technology, and public policy; and creating an interdisciplinary, interprofessional network of affiliated scientific and engineering societies to respond to needs and problems in the relationship between science and society.

The Foundation made a two-year grant of \$100,000 in 1976 to support these expanded functions of the AAAS.

- In June of 1976 the Foundation brought together some 30 persons representing schools of engineering, management, law, public administration, and public policy in a week-long Seminar on Education for the Public Service. One expected outcome of that Seminar will be a book on the field of education for the public service, cowritten by Stephen White, Vice President of the Foundation, and Prof. Joel Fleishman, director of the Institute of Policy Sciences and Public Affairs at Duke University. For further program development arising out of the Seminar and for research and publication costs for the book, Duke University received two grants totaling \$24,500. (Duke continues to conduct one of the most active programs in public policy education, offering both an undergraduate major in public policy and a master's degree in public policy concurrently with an advanced degree in another profession such as business administration, engineering, law, or medicine. Support for this program is continuing under a 1975 Sloan grant.)

Three smaller grants were approved in 1976 in the area of public management and public affairs:

Harvard University, Cambridge, Mass.	\$4,000
In support of research and lecture activities of Dr. George B. Kistiakowsky in science and public affairs.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$15,000
In support of work of the Political Science Department's News Study Group in making videotapes at the 1976 political party conventions for Public Television use and for M.I.T.'s inventory of research materials.	
New York State Legislative Institute, Baruch College, New York, N.Y.	\$20,000
In support of a Conference on State Government Management and Productivity.	

Economics and Management

Two important new economics research programs, in the economics of the family and in government regulation of the economy, received Sloan support in substantial amounts in 1976. Grants awarded in 1974 and 1975 for training and research in microeconomics at eight universities continued in effect, and a program in economics for working journalists received renewed support.

Education for the public service, discussed in the preceding section of this Report, absorbed most of the funds available for management education in 1976. All told, new grants described in this section of the Report came to nearly \$1.4 million for 1976.

Major New Research Projects

- Recent developments in economic theory, together with improved methods of data collection and analysis, have led to increasing interest in studying the family as a basic economic unit of society. One such development is the theory of human capital, which holds that much of society's productive capacity is embodied in human beings, and that this capital is created through a process akin to investment. Another new approach views households as not merely consumers of goods and services but also as active producers of things of value, for example good health, which cannot be purchased in the marketplace. Both these approaches have led to a heightened awareness of the importance of *time* and how it is spent, both within the family and over the life cycle.

Together with these theoretical advances there has come a significant increase in the quantity and quality of data available for economic analysis, and new statistical theory which, combined with low-cost, high-speed computers, makes possible economic analyses of the family in new depth and detail.

Some say the family is in serious trouble. Certainly it is changing with unprecedented speed, along with the changing status of women. Participation in the labor force of married women with children under six nearly tripled between 1950 and 1974; married women are contributing a growing percentage of family income, while the birth rate has sunk and the divorce rate has soared; the percentage of children under six living with only a mother doubled between 1960 and 1974; and the percentage of single-person households doubled between 1950 and 1970.

The National Bureau of Economic Research believes it would now be fruitful, using the new theoretical and statistical tools, to address some penetrating questions about the family, among them: What determines the division of labor among family members? How do changes in the earnings of one spouse affect the labor force participation of the other? How do changed expectations concerning long-term attachment to the labor force affect schooling and other decisions regarding occupational choice, marriage, and child bearing? How and why does marital status affect the age/earnings profiles of men and women? How and why does marital status affect health? How and why do the relative earnings of women and men affect marriage, divorce, and fertility?

Those and other questions will be studied by the National Bureau's Center for Economic Analysis of Human Behavior and Social Institutions, in Palo Alto, Calif. In this effort to probe deeply into the functions of the family as an institution and its relation to other social institutions, the Bureau's economists will have the cooperation as needed of scholars in demography, law, psychology, and sociology. A two-year Sloan grant of \$250,000 will assist the research.

- The efficacy of governmental regulation of economic activities has become a subject of national debate. There is either too much regulation or too little; regulatory agencies are either too hard or too soft on the industries concerned; regulation drives up costs, averts serious damages, or both. What is clear is that regulation has increased over the past decade or so and that a new kind of regulation has emerged, cutting across the entire economy to enforce standards of environmental protection, product and occupational safety, and nondiscriminatory employment.

An effort to develop a comprehensive understanding of regulation—its essential strengths and limitations, its positive and negative side effects in various situations, and its optimal institutional forms—is being undertaken by the American Enterprise Institute for Public Policy Research. The Institute through its new Center for the Study of Government Regulation is assembling a multi-disciplinary community of scholars to conduct long-term studies of all aspects of government regulation and to communicate their findings to policy makers and the public. Included in the Center's purview will be not only the

independent federal regulatory agencies and the newer economy-wide regulators, but also regulatory offices within the federal departments and in state governments. Also to be studied is regulation by less direct means, such as taxation, subsidies, direct legislation, antitrust actions, and others. The Center will attempt to develop a methodology for determining benefits and costs of particular regulatory programs.

The ambitious scope of the Institute's plan for the new Center has made multiple funding sources necessary, and several foundations have made major contributions to its support. The Sloan Foundation agreed to provide \$500,000 over a three-year period.

Continuing Projects

- A program in economics journalism, conducted by Princeton University's Woodrow Wilson School of Public and International Affairs, was conceived in 1974 in response to what was seen as a widespread lack of under-

Fellows in economics journalism at Princeton University receive a year's exposure to graduate-level economics before returning to reporting duties. Here some of them study urban economics in course conducted by Prof. Edwin Mills. There are eight fellows each year.



standing of pressing economic issues of growing complexity. More highly trained journalists, it was reasoned, were needed to comprehend and explain current economic events, which could not be understood without some background of advanced economic theory. The Woodrow Wilson School agreed to provide such training, beginning in 1975. The program is guided by an internal advisory committee of Princeton faculty and an external advisory board, mostly senior journalists. Frequent use is made of visiting speakers from government and from other universities and research institutions.

A second group of experienced journalists entered Princeton University in the Fall of 1976 to sharpen their skills in analyzing and reporting news of economics and business. The eight Alfred P. Sloan Foundation Fellows in Economics Journalism, averaging 32 years of age, are spending a year of graduate-level study in microeconomics, macroeconomics, quantitative analysis, a special policy workshop in economics journalism, and related economics courses which they and their mentors feel will heighten their ability to interpret economic policies and developments in the public media.

The Foundation in 1976 provided \$250,000 for a second year of fellowship stipends, tuition, and operational costs, bringing total support of the economics journalism program thus far to \$595,000.

- Florida Agricultural and Mechanical University, cited in the Foundation's Report for 1973 as the leading source of black accountants, has solidified and enhanced that position since then. It draws academically talented students from many parts of the nation and places them after graduation in leading national accounting firms, some of which have endowed chairs in accounting at Florida A. & M. Even while its accounting program has been rapidly expanding, its admissions criteria have become more selective.

During the period since the Foundation's 1973 grant, the University's Department of Business has become the School of Business and Industry, and is moving toward becoming the third business school among traditionally black institutions to gain full accreditation. To achieve that status, and to keep up with the rising enrollment of highly qualified accounting students, new faculty positions were required. The Foundation agreed to underwrite partially five such positions by a matching grant of \$100,000 over two years, after which state support for them is expected. In this instance an activity originally supported through the Foundation's expired Particular Program in Medicine and Management for Minorities is receiving extended support under the General Program.

- A study of the economics of higher education, with particular reference to the outcomes of higher education, received a third and final year of partial support in 1976. Dr. Howard R. Bowen, who is R. Stanton Avery Professor of Economics and Education at the Claremont Graduate School, is seeking to bridge a gap between higher-education specialists such as econo-

mists, psychologists, and sociologists, and the decision makers in government, foundations, and university administrations who largely determine the course of higher education. His work is expected to enlighten the continuing debate on the value of higher education as presently conducted.

The Foundation in 1976 granted \$60,000 to Claremont University Center for the completion of Dr. Bowen's study.

Economics and the Law

- Partly because of the growth of federal and state regulatory activity referred to above, the relationship of law and economics has become a matter of increasing interest to members of both disciplines. The Law and Economics Center of the University of Miami School of Law was established to provide intensive training in economics for law professors; in 1976 it began to offer a three-week summer institute in law for economists. The first institute attracted 23 young economists, some of them teaching economics in law schools and some doing research on the interrelationships of law and economics. The institute was deemed a success and seems likely to stimulate an increased amount of scholarly publishing in the field; the Center plans to continue and to slightly expand the institutes. The first was supported by a \$62,000 grant from the Sloan Foundation.

These other grants were approved in 1976 for projects related to the Foundation's interest in economics and management:

The American Assembly, New York, N.Y.	\$20,000
In support of an American Assembly program on capital formation.	
American Economic Association, Nashville, Tenn.	\$20,000
For a summer program to increase the number and educational opportunities of minority students in economics.	
Bentley College, Waltham, Mass.	\$20,000
For development of a curriculum in accounting and financial management for elected officials and mid-career employees in local government.	
Catalyst Inc.	\$20,000
In support of the Catalyst National Roster—a categorized and computerized compilation of women seeking managerial, technical, or professional positions.	
Dartmouth College, Hanover, N.H.	\$15,000
In partial support of the Consortium on Financing Higher Education's study, <i>The Effect of Rising Costs on College Choice</i> .	
Duke University, Durham, N.C.	\$5,660
For support of a workshop, sponsored by the Operations Research Society of America, on models for the introduction of operations research/management sciences in newly developed and developing institutions.	
Educational Change, Inc.	\$20,000
For partial support of a two-year pilot project in the preparation and publication of annual financial surveys of higher education and of individual institutions.	

Public Communication Foundation for North Texas, Dallas, Tex. \$20,000
For partial support of the research and development phase of a proposed television series on the economy, *The American Gift*.

University Centers for Rational Alternatives, Inc., New York, N.Y. \$20,000
For partial support of UCRA's 1976 conference on the relationships between the federal government and institutions of higher education.

Urban Academy of the City University of New York \$16,125
In support of the planning of a new management training program for New York City employees (paid to Research Foundation of the City University of New York).

Science and Technology

Efforts to stimulate applications of mathematics and to expand knowledge of the history of science were conspicuous among the scientific matters to which the Foundation devoted attention in 1976. Activities in science and technology, including the Particular Program in Neuroscience (see Page 46) and the Sloan Fellowships for Basic Research, have regularly commanded a major portion of the Foundation's resources.

Applied Mathematics

- Thoughtful mathematicians for many years have remarked on the desirability of a closer relationship between the two major divisions of their discipline, the pure and the applied. Methods developed in pure mathematics have found some striking and unexpected applications in recent years, and the time may be at hand at last for significantly narrowing the gap between the two divisions. Yet the scope of these powerful new applications is not adequately represented in the courses offered by the mathematics departments of most colleges and universities. The result is that the student whose career interests lie in using rather than creating mathematics may have difficulty finding courses that both challenge him intellectually and prepare him for the practical work of laboratories, industry, and business.

The National Research Council of the National Academy of Sciences is forming a Committee on Applied Mathematics Training to make detailed recommendations on the expansion of the applied mathematics curriculum in the undergraduate programs of colleges and universities. The effort has the support of leading societies of mathematics educators, researchers, and users. The new committee will seek to determine the nature of suitable applied mathematics training, the special efforts that may be needed to gain acceptance of new curricula, the potential for employment of graduates of the new training, and

what programs may be needed to train existing faculty to teach applied mathematics. In developing recommendations on these and other matters, the committee will take special care to see that they are widely disseminated and will discuss them in advance of publication with influential persons in the mathematics community.

The Committee on Applied Mathematics Training is being supported by a Sloan grant of \$66,550 to the National Academy of Sciences.

- One of the fields in which mathematics is becoming increasingly useful is environmental health, where masses of data can yield important clues when subjected to sophisticated mathematical analysis. The Institute for Mathematics and Society of the Society for Industrial and Applied Mathematics (SIAM) is mounting a major three-year project in which the skills of mathematicians, particularly statisticians, will be applied to such matters as pollutant distribution and its relation to health and mortality statistics. The project is related to the SIAM Institute's "transplant" program in which mathematicians are placed in medical schools, for example, to develop new applications and specialties in mathematics.

Participants in the SIAM study will be mathematicians in the Department of Statistics at Stanford University and the Division of Biostatistics of Columbia University's School of Public Health. The project's \$1 million budget is being raised from various foundations and government agencies; the Sloan Foundation made a three-year grant of \$88,000 to the SIAM Institute for Mathematics and Society, which will provide general oversight, coordination, and evaluation.

The History of Science

- At a time of heightened questioning of the institutions of society, the institution of science has come under increasing evaluative scrutiny. A group of faculty members at the University of Colorado—scientists, historians, philosophers, and psychologists—has taken note of this growing interest among both science and non-science students, and is seeking to respond to it. With the aid of a \$35,000 Sloan grant to the University, they are now conducting a year-long seminar to develop a comprehensive series of courses in the history of science which will reflect all of their diverse and specialized perspectives on the subject. A regional conference on the teaching of history of science is planned, and the University will create a new faculty position in history of science. The objective is not to train historians of science, but to foster a historical and critical awareness of science in the University.

- The growth of American physics and astronomy in the twentieth century is a phenomenon resulting from many cultural and intellectual forces which are not fully comprehended. Immigration of scientists from Europe and elsewhere, spurred by World War II and the events that led up to it, was an

important factor, but there seems also to have been an enormous growth of native talent which helped propel the nation to its present eminence in physics. Just how this all occurred may be illuminated by a project being undertaken by the Center for History of Physics of the American Institute of Physics. The Center is creating an oral history of American physics in this century, based upon interviews with surviving pioneers in the field, which will be added to its present extensive library and archives. A three-year Sloan grant of \$50,000 to the American Institute of Physics is helping to support the work.

Basic Research

- The Foundation's program of fellowship support for creative young scientists entered its 22nd year in 1976, and the number of persons who have been assisted by it reached 1,311. Of that number, 91 were new fellows selected in 1976, and another 86 were receiving support granted in earlier years. Since the program began in 1955 the Foundation has allocated some \$26.5 million for fellowships at 148 institutions in the United States and Canada. Currently the annual appropriation for the program is \$1.55 million.

The Sloan Fellowships for Basic Research, as their rather long history suggests, appear to the Foundation to be continuing to fulfill a need which still is not well met by other sources of funds. This is the need of the beginning scientist, often in his or her first faculty appointment, for even a limited amount of "free" money which can be flexibly and selectively applied to those research requirements which seem most pressing. These may include technical assistance, the ability to employ a predoctoral or postdoctoral fellow, computer time, professional travel, summer support, occasionally a reduced teaching load, a relatively small piece of equipment, and laboratory supplies. The fellowship awards average \$17,500 over two years, and the flexibility which they permit is said to enhance their value.

The Foundation does not accept direct applications for the fellowships, and it does not require research proposals. Nominations of young scientists of outstanding potential come to the Foundation from senior scientists and are reviewed by a Program Committee of two distinguished scientists from each of the four fields covered (physics, mathematics, chemistry, and neuroscience). Once a fellow has been selected he is free to pursue whatever research is of greatest interest to him and, so far as the Foundation is concerned, he may shift the direction of his research at any time.

It is through this means, by conferring a measure of freedom and flexibility (and recognition) on brilliant young researchers in their most creative years, that the Foundation believes fundamental advances in new knowledge are most likely to occur.

Current members of the Program Committee, who are responsible for reviewing some 500 nominations a year, are:

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|---|---|
| Dr. T. D. Lee, Professor of Physics,
Columbia University, Chairman. | Dr. I. M. Singer, Professor of Mathematics,
Massachusetts Institute of Technology. |
| Dr. William M. Fairbank,
Professor of Physics,
Stanford University. | Dr. Eliot Stellar, Provost,
University of Pennsylvania,
a neuroscientist. |
| Dr. Jurgen Moser,
Professor of Mathematics,
New York University. | Dr. Gilbert Stork, Professor of Chemistry,
Columbia University. |
| Dr. Francis O. Schmitt,
Neurosciences Research Program. | Dr. John S. Waugh, Professor of Chemistry,
Massachusetts Institute of Technology. |
- (Drs. Fairbank, Moser, Stellar, and Waugh were appointed to the Program Committee early in 1977.)

Sloan Research Fellows selected in 1976, their institutions, and their fields of science, are:

- | | |
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| University of Arizona
Chemistry: M. Bonner Denton
Physics: George H. Rieke,
Richard L. Shoemaker | University of California, San Diego
Mathematics: James P. Lin |
| Bowdoin College
Mathematics: John D. Fay | University of California, San Francisco
Neuroscience: Stanley B. Prusiner,
Jennifer H. Lavail |
| University of British Columbia
Chemistry: Alan G. Marshall | University of Chicago
Neuroscience: Paul Grobstein
Physics: Lawrence Grossman,
Kathryn Levin, Robert M. Wald |
| California Institute of Technology
Chemistry: John E. Bercaw,
W. Henry Weinberg
Neuroscience: Albert J. Hudspeth | College of William and Mary
Chemistry: Eric Herbst
Physics: Carl E. Carlson |
| University of California, Berkeley
Chemistry: K. Peter C. Vollhardt
Mathematics: Leo A. Harrington,
Arthur E. Ogus
Neuroscience: Robert S. Zucker | Colorado State University
Physics: Alan K. Betts,
William M. Fairbank, Jr. |
| University of California, Irvine
Chemistry: Mario J. Molina | University of Colorado
Mathematics: Martin E. Walter |
| University of California, Los Angeles
Chemistry: Eric J. Heller
Mathematics: Richard Elman,
Mark L. Green | University of Colorado Medical School
Neuroscience: Francisco J. Varela |
| University of California, Riverside
Neuroscience: Richard W. Olsen | Columbia University
Chemistry: Walter G. Klemperer
Neuroscience: James P. Kelly |

Cornell University
Mathematics: Dan Kubert
Physics: John B. Kogut

Dartmouth College
Chemistry: Robert Ditchfield
Physics: P. Bruce Pipes

University of Florida
Neuroscience: William G. Luttge,
Steven F. Zornetzer

Harvard University
Chemistry: Bennie R. Ware
Physics: Eric J. Chaisson,
Howard M. Georgi III

University of Illinois, Urbana-Champaign
Chemistry: David N. Hendrickson

Indiana University
Chemistry: Attila Szabo

Iowa State University
Chemistry: Philip M. Warner

Johns Hopkins University
Chemistry: Paul J. Dagdigian
Physics: Arthur F. Davidsen

Massachusetts Institute of Technology
Chemistry: Richard R. Schrock,
Edward I. Solomon
Physics: John D. Joannopoulos, Paul C. Joss
Neuroscience: Michael A. Moskowitz

Michigan State University
Chemistry: Robert I. Cukier
Physics: Robert G. H. Robertson

Middlebury College
Physics: P. Frank Winkler

University of Minnesota
Physics: Roberta M. Humphreys

State University of New York, Stony Brook
Chemistry: Jimmie D. Doll
Mathematics: Henry B. Laufer

Northwestern University
Physics: George K. Wong

Ohio State University
Chemistry: John M. Parson

University of Pittsburgh
Chemistry: Julius Rebek, Jr.

Princeton University
Chemistry: Malcolm H. Chisholm,
Jeffrey Schwartz
Mathematics: Jurg M. Frohlich,
Allen E. Hatcher
Physics: Frank A. Wilczek

Purdue University
Chemistry: Steven Adelman
Physics: Bernard A. Weinstein

Rice University
Physics: F. Barry Dunning
Mathematics: Michael E. Taylor

University of Rochester
Chemistry: Thomas F. George,
Thomas R. Krugh

Rockefeller University
Mathematics: Thomas C. Spencer
Neuroscience: Sarah F. Leibowitz

Rutgers University
Mathematics: Jean E. Taylor
Physics: Haruo Kojima

Salk Institute
Neuroscience: Steven J. Henriksen

University of Southern California
Chemistry: Christopher A. Reed

Stanford University
Chemistry: Keith O. Hodgson

University of Tennessee
Neuroscience: John G. Wood

Texas A&M University
Physics: Robert E. Tribble

Washington University
Neuroscience: Robert C. Collins,
Edward V. Famiglietti, Jr.

University of Washington
Chemistry: Weston T. Borden,
Nicolas D. Epiotis
Physics: Paul E. Boynton

Wayne State University
Chemistry: Robert K. Boeckman, Jr.
Physics: Talbert S. Stein

University of Wisconsin, Madison
Mathematics: Linda P. Rothschild

● The Sloan-Kettering Institute for Cancer Research, established with Sloan Foundation support in 1945, continued in 1976 to investigate the mysteries of cancer across a wide range of biological sub-disciplines. The study of molecules on cell surfaces is yielding new insights into how communities of cells behave, or in the case of cancer, misbehave. The relationship of viruses to cancer, the role of the immune system in fighting cancer, and a possible genetic basis of cancer all are being studied in the search for new pieces to the cancer puzzle. At the same time, the Institute serves as a training ground for future cancer researchers through its program for postdoctoral fellows. Its close relationship with Memorial Hospital for Cancer and Allied Diseases, through Memorial Sloan-Kettering Cancer Center, assures that research findings are translated promptly into new forms of treatment for cancer patients.

The Foundation has made annual contributions for research at the Sloan-Kettering Institute since the Institute's founding, along with occasional major grants for new facilities required by the Institute's expanding operations. For 1976 the Foundation's contribution was \$600,000, which included \$400,000 committed earlier. This was about 2 per cent of the Institute's total budget, of which about three-fourths is provided by federal health-research agencies.

Technology and the Performing Arts

● A possible solution to the persistent financial problems of the nation's cultural institutions is being tested by Lincoln Center for the Performing Arts in New York City. The Center's Media Development Department is experimenting with live telecasts of concerts, opera, and ballet with the ultimate goal of creating a network of paying subscribers who would contribute substantially to reducing or eliminating the Center's annual deficits.

The initial "Live From Lincoln Center" programs are being broadcast over a network of public television stations; the Center's marketing plan calls for distribution in time by some form of pay television, probably involving satellite and cable transmission. The Sloan Foundation through a 1973 grant supported research and development to solve some of the technological problems of live telecasting from a concert hall or opera house. A two-year grant of \$189,000 approved in 1976 will support further development, specifically of equipment to expand the range of lighting conditions which the system can accommodate, and of a sound-security device to deliver the audio portion of the telecast (which is high-fidelity stereo sound) only to future paying subscribers.

Yale University
Chemistry: Thomas Keyes
Mathematics: James Lepowsky
Physics: Itzhak Bars

Book Program

● In years past the Sloan Foundation has supported several efforts to improve public communication about science, technology, economics, and closely related areas in which the Foundation is operative. These efforts have included advanced training programs for journalists, educational films, and what is now called the science information movement. While most of these activities have been helpful in maintaining some public awareness of the methods, goals, and values of these intellectual disciplines, it is evident that much more remains to be done. Foundation Trustees have now authorized the officers to undertake a new approach—the commissioning of about 15 books, by eminent scholars in the fields in which the Foundation is active, about their work as a humanistic and cultural endeavor. The authors are being asked to concentrate not on the *results* of work in a particular discipline but on the nature of the intellectual enterprise that culminated in those results. The hope is to enlighten the serious adult reader as well as the bright undergraduate and graduate student about the manner in which advances in knowledge affect the individual's sense of his place in nature and his relation to the universe of which he is a part. The tangible outcome is to be a coherent series of books, commercially published.

The Trustees during 1976 appropriated for this undertaking \$350,000, principally to support research and writing during the first three years of the program. The funds also will support the work of an editorial Advisory Committee, chaired by Dr. Robert L. Sinsheimer, chairman of the Division of Biology at California Institute of Technology, which is monitoring the progress of each separate project and issuing invitations to other prospective authors. Other members of the committee are: Dr. Howard Hiatt, Dean, Harvard School of Public Health; Dr. Mark Kac, Professor of Mathematics, Rockefeller University; Mr. Winthrop Knowlton, President, Harper & Row, Publishers, Inc.; Dr. Daniel McFadden, Professor of Economics, University of California, Berkeley; Dr. Robert Merton, University Professor, Columbia University; Dr. George Miller, Professor of Experimental Psychology, Rockefeller University; Dr. Philip Morrison, Institute Professor, Massachusetts Institute of Technology; Dr. Frederick E. Terman, Provost Emeritus, Stanford University.

It is anticipated that this series of publications will be completed within five years.

Other grants for activities in science and technology in 1976:

American Association for the Advancement of Science, Washington, D.C. For partial support of the AAAS Congressional Science and Engineering Fellows program.	\$20,000
For a symposium at the AAAS annual meeting on barriers to professional development for women in science.	\$1,460

University of California, Santa Cruz, Calif. For support of a graduate program in photochemistry.	\$20,000
University of Colorado, Boulder, Colo. In support of the University's 1976-77 Science in the Public Interest Lectures and Science News Writing Seminar.	\$7,380
Columbia University, New York, N.Y. To support for two years the interdisciplinary Columbia Science Colloquium for science faculty members.	\$4,800
East Asian History of Science Trust, Cambridge, England Toward support of the scholarly work of Dr. Joseph Needham in ancient Chinese science and technology.	\$20,000
University of Georgia, Athens, Ga. In partial support of a project on studies in stochastic systems at the University's Center for Applied Mathematics.	\$20,000
Harvard University, Cambridge, Mass. To underwrite the costs of preparing a paper on science for a meeting of university presidents and foundation executives concerned with the future of the nation's major research universities.	\$10,826
International Baccalaureate North America, New York, N.Y. To support revision and expansion of the International Baccalaureate's syllabus and examinations in the natural sciences.	\$16,000
Massachusetts Institute of Technology, Cambridge, Mass. For partial support of a conference on the teaching of physics to students majoring in other science and engineering fields.	\$15,000
For support of a research project on blacks in American science and technology.	\$20,000
In support of a project on Work in Technology and Science.	\$20,000
National Academy of Sciences, Washington, D.C. For renewed partial support of a series of Academy Forums on science and its relevance to public policy.	\$5,000
To help defray expenses of a two-day symposium marking the 30th anniversary of the Office of Naval Research.	\$10,000
Princeton University, Princeton, N.J. For partial support of preparation of the second edition of Prof. Fritz Machlup's book, <i>The Production and Distribution of Knowledge in the United States</i> .	\$15,000
Stanford University, Stanford, Calif. In support of research and development for a proposed film series based on Dr. Lewis Thomas' book, <i>The Lives of a Cell</i> .	\$20,000

Particular Programs



Minority Engineering Education

The Particular Program in Minority Engineering Education assumed fully national dimensions in 1976 with the establishment of a national curriculum-development center for pre-engineering education and the complete activation of a consortium of engineering schools in the Southeastern region. The program's focus is now very largely on preparation at the secondary-school level for future engineering studies; however, an effort also is under way to increase the number of minority engineers holding graduate degrees, and a national consortium has been formed for that purpose.

New commitments under the Particular Program in 1976 exceeded \$2.7 million, the highest level in the program's three-plus years, bringing aggregate commitments thus far to \$6.7 million. The program is expected to continue for three more years.

The program was conceived at a time when blacks and other minorities (Chicanos, Puerto Ricans, native American Indians) numbered only 2.8 per cent of all practicing engineers; a Sloan-supported task force in 1974 set as a goal for 1982 a minority representation among first-year engineering students of 18 per cent, equal to the four minority groups' projected share of the college-age population in that year.

Enrollment of minority engineering freshmen in the Fall of 1976 continued to run ahead of optimistic projections made by the Sloan task force in 1974; but because overall freshman engineering enrollment far exceeded expectations, the increase in the minority percentage was limited, from 7.1 per cent in 1975 to 7.7 per cent in 1976. Perhaps most encouraging was the absolute growth in numbers of minority freshmen, from 5,344 in 1975 to 6,309 in 1976, an increase of 18 per cent, about double the rate of increase for all engineering freshmen.*

* Source: Engineering Manpower Commission of Engineers Joint Council. Comparisons are based on revised data for 1975.

No one factor accounts for these gains toward equity in the profession of engineering. Rather, they are the result of a growing effort involving engineering colleges, public schools, professional societies, industry, government agencies, foundations, and specially created entities. Among the latter is The National Fund for Minority Engineering Students, established in 1975 to help overcome the most serious obstacle to increasing minority engineering enrollments, lack of adequate student financial support. The Foundation made a three-year grant for administrative support of the Fund in 1975.

Secondary-School Efforts

One of the attractive features of engineering study for minority groups (or for anyone) is that it normally leads to a professional degree and relatively well-paid employment after just four years of college. This of course means that pre-engineering study, unlike pre-medicine and pre-law, takes place in secondary schools; and, because engineering is among the most rigorous courses of study offered by most colleges and universities, the quality of the student's high-school preparation for it becomes crucial. This fact is now widely recognized and has given rise to programs in a number of regional consortia and individual institutions, to try to insure that incoming minority engineering freshmen with a reasonable chance to succeed will become more numerous.

- Helping secondary schools across the nation to prepare students—especially minority students—more effectively for engineering study is the mission of the National Coordinating Center for Curriculum Development (NCCCD), established early in 1976 at the State University of New York at Stony Brook. Its director is Dr. John G. Truxal, formerly dean of the University's College of Engineering and Applied Sciences, in which NCCCD is based as part of the College's Program on Technology and Society. A Sloan grant of \$765,000 (paid to the Research Foundation of the State University of New York) is supporting the curriculum center's first year of operation, and further support is planned.

Among the Stony Brook center's numerous functions, the central one is developing engineering-oriented educational materials and getting them introduced and tested in secondary schools in urban centers with large minority populations. To begin this work, the center in the summer of 1976 convened an eight-week curriculum-development workshop at which faculty members from 14 high schools and seven engineering colleges across the nation joined forces to produce some 30 learning modules. Some 24 of these are now in use and more are on the way. The modules, which may consist of tapes and slides as well as printed materials, are in the subjects of science, mathematics, and the all-important skills of communications. They are designed to be woven into regular high-school courses as the teacher sees fit, or taught as a unit of about

ten class periods. Other materials are primarily informational and motivational, intended to answer questions about the engineering profession for students, parents, guidance counselors, and school administrators.

To get these materials into use, NCCCD has created a growing network of inner-city high schools, each associated with an engineering college in its area which helps the schools learn to use the modules emanating from Stony Brook. Currently participating are about 35 secondary schools in eight cities—New York, Washington, D.C., El Paso, Houston, Boston, Atlanta, Chicago, and Philadelphia. The number of cities and schools involved will be expanded during 1977. In areas where there are consortia of engineering schools concerned with minority students, NCCCD works in cooperation with them. The intention is to create a number of regional curriculum-development centers which will produce materials adapted to local needs.

Evaluation of the Stony Brook materials will assume growing importance as they come into wider use. Through a process of feedback from the schools, improvements in them will be made and the most fruitful approaches identified. The center's sizable staff is in frequent contact with the participating schools and colleges, and indeed with virtually every organization (some of them mentioned below as recent grantees) concerned with minority engineering education. Efforts are under way to elicit greater interest from industry and government. Community involvement is emphasized in each area, and special materials to stimulate it are disseminated.

Thus the Stony Brook center is both an educational research and development laboratory and a catalyst for other activities in its designated area of concern. Its efforts, added to all of those previously under way, seem likely to lead to accelerated progress toward the common goal.

- A program specifically linked to the work of the Stony Brook curriculum center is being initiated by the Southeastern Consortium for Minorities in Engineering with a two-year Sloan grant of \$500,000 (paid to Georgia Tech Foundation, Inc.). Members of the Consortium, some of which received preliminary Sloan support in 1975, are the University of Alabama, Tuscaloosa; University of Florida, Georgia Institute of Technology, University of South Carolina, Tennessee State University, University of Tennessee, Knoxville; and Tuskegee Institute.

The Consortium's effort will be directed toward introducing the Stony Brook curriculum materials into secondary schools of the Southeast, which are said to enroll 40 per cent of all black high-school students. Initially four regional conferences are being held with leaders of some 75 school systems to explain the work of the Consortium and the Stony Brook center. The systems are being invited to submit proposals for implementing pre-engineering curriculum programs, and it is expected that 35 of them will be selected to participate.

Stony Brook staff will train participating teachers during a two-week summer session, and use of the materials will begin in the fall of 1977, with engineering and education faculty from Consortium members advising and assisting. Early in 1978 the Consortium and the Stony Brook center will evaluate the program and develop plans for its modification and expansion. During the projected three years of the program an estimated 150,000 minority high-school students will be in one or more classes in which the new materials are used.

- Aided by a two-year Sloan grant of \$750,000 awarded in 1975 to the Committee on Institutional Cooperation (CIC), 14 Midwestern universities are seeking in a variety of ways to identify minority students having an aptitude for engineering, to help their schools develop that aptitude, and to enroll them as engineering students. The 14 schools enroll about 30 per cent of all engineering students, and they have recently been joined by Wayne State University and the University of Detroit. CIC is an academic consortium consisting basically of the Big Ten universities and their various campuses; in the program called CIC+ MPME (Midwest Program for Minorities in Engineering) the "plus" refers to the Illinois Institute of Technology, the University of Notre Dame, and now the two Detroit institutions.

While the 1975 grant has yet to expire, experience indicates that immediate beneficial results could be obtained by an accelerated effort in the Chicago area and, a little later, in Detroit. In Chicago the four responsible universities—Illinois Institute of Technology, Northwestern University, and the University of Illinois' Urbana-Champaign and Chicago Circle campuses—were ready to expand rapidly their collaborative effort to embrace some 8,000 students in about forty secondary schools having minority enrollments over 50 per cent. The four-university collaboration in Detroit—the Universities of Michigan and Detroit, and Michigan State and Wayne State Universities—is newer, but planning is going forward and the expansion to a city-wide program should occur by 1978. It is expected that the best features of the Chicago program, as experience reveals them, will be incorporated in the Detroit program.

For the expanded CIC+ MPME effort in Chicago and Detroit the Foundation made a two-year grant of \$397,450, payable to Northwestern University.

- Perhaps the most intensive regional minority-engineering effort exists in the Philadelphia area, where PRIME (Philadelphia Regional Introduction for Minorities to Engineering) brings together eight colleges and universities (Drexel, Lincoln, Temple, and Villanova Universities; the University of Pennsylvania; Widener and Spring Garden Colleges, and the Community College of Philadelphia); the school districts of Philadelphia, Camden, and Chester Upland; and twenty business corporations, professional societies, and community groups. Some 750 pre-college students and 240 college students are in-

volved in various phases of PRIME's activities to increase minority engineering enrollments and graduates.

During 1977 PRIME will bring about the introduction into a large number of Philadelphia schools of the pre-engineering materials being developed by the National Coordinating Center for Curriculum Development at Stony Brook. PRIME and its member engineering schools will work with teachers and schools and will closely monitor the pilot phase of the project. In the summer of 1977 PRIME and the Stony Brook center will conduct a workshop to introduce the new curriculum modules to teachers from a wider area. For these purposes and for administrative support of PRIME, the Foundation granted \$125,000, a continuation of support begun in 1975 with a grant of \$60,000.

- An opportunity to stimulate the flow of Mexican-American or Chicano youths into engineering schools exists at the University of Texas at El Paso, a growing institution with a 35 per cent Chicano enrollment. The University's College of Engineering is working with the two independent school districts in El Paso County, each of which has a majority of Chicano students,

Chicano engineering students attend a laboratory demonstration at the University of Texas at El Paso as faculty members look on. The University is working to increase its annual minority enrollment of engineering freshmen from 100 to 160 with Sloan assistance.



to encourage interest in and preparation for engineering study. Some 6,500 students a year graduate from the two districts.

Over the next three years, University engineering faculty members will be assisting high-school teachers of science, mathematics, and English in incorporating into their courses the new materials being developed at the Stony Brook curriculum center. Each summer a two-week workshop for 20 teachers will be held at the University to introduce the Stony Brook materials. Also, the University will conduct two-week summer programs for high-school freshmen and sophomores; strengthen its tutoring program for engineering students, and disseminate information about the engineering profession to the community. By these means it hopes to increase the number of Chicanos entering its engineering school each year from 100 to 160. It is also expected that some El Paso students will be motivated to enter other schools of engineering.

For these activities the Foundation made a three-year grant of \$241,000 to the University of Texas at El Paso.

- Marquette University received renewed support of \$75,000 for a program conducted with Inroads, Inc., which assists Milwaukee minority students all the way from the ninth grade to an engineering degree at Marquette. During the secondary-school years students do extra academic work, attend a summer session, go on field trips, and visit with corporate engineers. Those who complete this phase are admitted to Marquette with a guarantee of full financial aid and summer jobs with sponsoring corporations. The number of students participating grew from 30 to 45 in 1976 and is expected to reach 60 in 1977.

Inroads, Inc., established in 1969, has developed productive relationships with the higher education community, the business community, and the public schools in a number of cities besides Milwaukee, including Chicago, St. Louis, and Cleveland. Several hundred students and more than a hundred business firms are involved in its projects. A substantial part of its support comes from business.

- Since 1974 the Engineers' Council for Professional Development (ECPD) has sponsored a program of two-week summer sessions on college campuses for minority students who have completed their junior year of high school. The program, called MITE (Minority Introduction to Engineering), has reached a level of more than 1,200 students on some 30 campuses each summer, and seems to be having the desired effect. A survey of the first group of students (the 1974 group) found that in 1975 some 80 per cent were enrolled in engineering schools; before they attended the MITE program only 52 per cent were inclined toward engineering. Incidentally a sizable fraction, about two fifths, of MITE participants are females.

The MITE program is largely supported by industry and to a lesser degree by government and foundations. The Sloan Foundation provided \$190,000 for

the 1975 program; for 1976 the Foundation made a contingent grant to ECPD of \$90,000 which was matched by substantially larger funds from industry.

Graduate Programs

While programs such as those described above are having a significant impact on the number of minority high-school students who are qualified to enter and succeed in engineering schools, at the opposite end of the educational spectrum, the graduate level, the picture remains bleak. In a recent year only about 1 per cent of all master's degrees in engineering were awarded to minority students, and for Ph.D.'s the minority share was less than 1 per cent. Thus the minority engineering student sees few, if any, faculty members of his own ethnic background, and this makes it more difficult to convince him that opportunities in engineering are open to him. The Foundation in 1976 provided support for two efforts to remedy this situation.

- The National Consortium for Graduate Degrees for Minorities in Engineering, Inc., established in 1975, is a collaborative effort of 19 engineering colleges and nine industrial and governmental members, based at the University of Notre Dame.* Its goal is to increase by 100 each year the number of minority students receiving master's degrees in engineering. This would qualify them for research positions in industry and government laboratories, or for programs leading to the Ph.D.

The Consortium selects students in their junior undergraduate year, after which they are employed for the summer by one of the participating laboratories or companies, with close guidance by an experienced engineer. During their senior year they apply to one or more of the participating graduate schools, and after admission they are supported financially until they attain the master's degree. While in graduate school they continue to work in laboratories or industries during the summers.

Each member laboratory or company contributes \$15,000 a year to the Consortium, and the universities also make substantial contributions. In order to expand the program more rapidly than would otherwise be possible, the Consortium requested and received a three-year Sloan grant of \$450,000, payable to the University of Notre Dame.

- A program designed specifically to increase the number of minority engineering teachers is getting under way at the University of Michigan College

* Participating universities include the California, Georgia, Illinois, and Massachusetts Institutes of Technology; Tuskegee Institute; Arizona State, Boston, Cornell, Howard, Johns Hopkins, North Carolina A & T, Purdue, Rice and Stanford Universities, and the Universities of Florida, Illinois, Michigan, Notre Dame, and Texas.

Participating laboratories and companies include Argonne National Laboratory, Bell Telephone Laboratories, Jet Propulsion Laboratory, Johns Hopkins Applied Physics Laboratory, Oak Ridge National Laboratory, Sandia Laboratories, Savannah River Laboratory, Stanford Linear Accelerator Center, and Atlantic Richfield Company.

of Engineering. Beginning in 1977, the College will conduct an eight-week summer program for about 25 selected minority students who have completed their sophomore or junior year at one of the Big Ten or traditionally black engineering colleges. The emphasis will be on fostering in them two essential characteristics of good engineering teachers: intellectual curiosity that leads to an interest in research, and the capacity to communicate the results of such research. Each student will be assigned to work in a faculty research project, and will be trained in preparing reports, proposals, and oral briefings. Additionally, students will be coached on how to prepare and apply for graduate school, and will have an opportunity for practice teaching. Six hours of academic credit will be awarded on successful completion of the summer program.

The Foundation made a grant of \$80,000 to the University of Michigan in support of the first year of the program.

These other grants were awarded in 1976 for efforts in minority engineering education:

University of California, Berkeley, Calif. **\$2,750**
For partial support of explorations looking toward expansion of the MESA (Mathematics, Engineering, Science Achievement) program for minority high-school students.

Freedom House, Inc., Roxbury, Mass. **\$7,500**
In support of a program to identify, recruit, and help prepare minority high-school students for engineering education.

Polytechnic Institute of New York, Brooklyn, N.Y. **\$10,000**
For partial support of a longitudinal study of retention, performance, and career development of blacks in engineering.

Western Institute for Science and Technology, Waco, Tex. **\$19,800**
For consulting services to the High School for Engineering Professions in Houston, Tex.

Technology in Education

At the close of 1970 the Foundation reached a decision to embark on a third Particular Program, designed to explore the potentialities of technology for enhancing the effectiveness and perhaps helping to control the rising costs of education. Six years, eighty grants, and eight million dollars later, grant making under this program has been brought to an end.

The program was a broad one, embracing technologies as diverse as the interactive computer and the programmed text, and academic disciplines as varied as music and genetics. About the hundreds of educational experiments stimulated by this program, obviously no general statements can be made; their effectiveness will be judged by the extent to which they are incorporated into the regular instructional activities of academic departments, schools, and institutions. And, strictly speaking, the Particular Program is not yet concluded, because some projects supported by it are still in progress; several were initiated in 1976.

Cable on Campus

Early in the program it appeared desirable to establish one or more sizable centers of research and development where new ideas in educational technology could be put into use, evaluated, and demonstrated. There was also considerable interest in the concept of the "wired campus," with principal centers of activity connected by a broad-band coaxial cable for transmission of television and other forms of electronic information. These interests converged at two leading institutions, Dartmouth College and Massachusetts Institute of Technology.

- The Foundation's first major "wired campus" grant, of \$600,000 in 1973, has enabled Dartmouth College to complete the first stage of a two-way cable television system connecting all of the major buildings on campus, and

to launch a variety of educational experiments in numerous subject areas. A central administrative entity, the Office of Instructional Services and Educational Research (OISER), has been created to manage the cable system and to provide technical services, advice, and funding for faculty members interested in applying technology to their instructional work.

The Dartmouth cable system makes possible the sending of video programming to major points on campus both from a central studio and from any of twenty-one locations where lectures, seminars, and sports and cultural events are taking place. Initially two channels are being used several hours a day, but the system's great capacity insures that time and channel space will be available for almost any foreseeable demand. A separate cable installed at the same time will make possible increased efficiency and lower cost in the operation of Dartmouth's extensive campus computer system.

Apart from the cable operation, Dartmouth faculty members have pioneered a number of significant developments in educational technology, some of which may spread to other institutions. One of them is a computer-music synthesizer system which has enabled the music department to expand enrollments in theory and fundamentals of composition. A minicomputer in the Thayer School of Engineering, connected by its own cable to terminals in the music department, accommodates four students simultaneously for drills and composition exercises. The system also has been used for advanced composition by serious composers. In other departments, a system of video instruction in languages has proved successful, and major educational technology projects were developed in art history and mathematics.

In numerous other disciplines, Dartmouth scholars have conducted experiments using educational technology and are eager to do more. OISER, directed by Prof. William Smith, selects proposed projects for initial support, assists in their development, and evaluates the results. In some cases substantial development funds are obtained from other foundations.

Dartmouth thus has established considerable momentum in demonstrating ways in which technology can be used to enhance an educational program already of high quality. To help sustain that momentum, and to continue development of the campus cable system, the Foundation in 1976 made a second grant, \$323,000, payable over three years.

- Work on a campus cable television system at Massachusetts Institute of Technology has gone forward with the aid of a \$620,000 Sloan grant awarded in 1974. By September of 1976 a first-phase system was in operation, carrying two channels of daily programming to dormitory common rooms, classrooms, laboratories, auditoriums, and offices. And scores of students and faculty members were involved in developing their own ideas for instructional, public-affairs, and creative programs.

As at Dartmouth, the M.I.T. system has a large reserve capacity and has

a two-way capability which permits program origination at points where events such as concerts, athletic contests, small seminars, and laboratory demonstrations are occurring. The system extends to dormitory buildings, and some individual students' rooms are being connected to it by the students.

M.I.T.'s Center for Advanced Engineering Study, where the cable system is based, provides equipment, instruction, and assistance for faculty members who wish to experiment with the use of video techniques for their courses. Its hope is that the academic departments in time will become regular users of the system and will pay enough in fees to support it. Other institutions and industries in the Boston-Cambridge area are interested in being connected to the system; thus it may serve to establish firmer links between M.I.T. and the surrounding community.

Further development of the M.I.T. cable operation will involve increased program production, eventual creation of two-way communication with M.I.T. computers via the cable (perhaps from students' rooms), and of course expansion of the number of outlets both on and off campus. To help support this continued growth, the Foundation made a second grant, \$490,000, in 1976.

- At Duke University a previously idle cable channel which serves most dormitory common rooms is being operated by a student group during the current academic year with the aid of a \$20,000 Sloan grant. If the project's programs of discussions, interviews, athletics, and cultural events win a sufficient audience, future support will be sought from a small increase in the student activity fee.

Libraries and Reading

The rapid growth of research collections in the nation's leading libraries, and their even more rapidly growing costs, have led some libraries to band together in consortia to promote sharing of resources and the automation of their bibliographic functions. The Foundation provided partial support in 1974 for such a consortium in the Northeast, the Research Libraries Group, composed of four large research libraries—Harvard, Yale, Columbia, and the New York Public Library. In 1976 an analogous combination was formed on the West Coast.

- Directors of the libraries of Stanford University and the University of California, Berkeley, have found that their holdings are doubling every 16 years and their expenditures are more than doubling every ten years. They concluded: "No single research library can acquire all the books it requires to keep up with the complex needs of graduate students and faculty it must serve."

Recognition of that fact led to a decision by the two universities to join forces in a Research Library Cooperative Program which will endeavor to make available to faculty and graduate students of the two institutions the combined resources of the libraries of both. A central feature will be the expansion



Libraries of the University of California, Berkeley, and Stanford University are cooperating to make their resources available to faculty and graduate students of both institutions. Stanford's computerized bibliographic system, shown here in operation, will be expanded to Berkeley as part of an effort to control rapidly rising costs of major research libraries.

sion of Stanford's computerized bibliographic system to the Berkeley library; this will make possible the rapid location of books and other materials in either system, and it will allow each library to monitor the other's acquisitions, so that unnecessary duplication can be avoided. Each library will build on its particular strengths. A regular system of transportation between the two campuses will be established for the movement of books and scholars, and reciprocal borrowing and lending procedures will be instituted.

Stanford and Berkeley hope that the system which they devise will be useful as a model to other institutions, and they will conduct exploratory studies aimed at expanding their cooperative program to other institutions in northern California and elsewhere on the West Coast. The Sloan Foundation granted three-year support of \$300,000, payable to Stanford University; the Andrew W. Mellon Foundation provided complementary support, as it did for the Research Libraries Group.

- While it may be said that too many books are being published for the comfort of some librarians, for the blind or visually handicapped person the problem is that only about 5 per cent of them are translated into Braille or

into audio recordings. Few textbooks are so translated, and for more ephemeral material—correspondence, newspapers, and other periodicals—the blind person's usual recourse is to a live reader.

Among the several types of artificial reading devices now under development, a machine which converts printed text into synthesized speech has been selected by the National Federation of the Blind for trial and evaluation. The Federation will place six of the prototype machines in user situations around the country—in offices, college libraries, rehabilitation centers, and more briefly in private homes—to assess their social impact and, in a carefully structured formative evaluation, will feed back information about users' experiences to design engineers who are continuing to improve the machine. The Federation regards this as an unusual example of a product's ultimate consumers participating in its design.

In its present stage of development the Kurzweil reading machine, invented by a small firm in Cambridge, Mass., can scan a page of printed material in most common typefaces and transmit photoelectric information to a minicomputer which, relying on a fairly complex set of programmed rules, recognizes individual words and issues phonetic commands to a synthesizer for the production of speech sounds. The user controls the reading through a small array of push buttons; he can back up, skip forward, pause and have a word spelled out, vary the reading speed up to 200 words per minute, and perform most of the other functions of active reading. Most high-school students in initial tests have been able to gain some proficiency with the machine in three or four hours.

The National Federation of the Blind, representing 50,000 members, considers the Kurzweil machine an unusually promising development and has organized a research program to insure that it is thoroughly evaluated and brought to its full potential. The Foundation made a two-year grant of \$100,000 to the Federation for this program.

Updating Engineers

The continuing education of practicing engineers, to equip them to meet the changing requirements and opportunities of their profession, has been recognized as a necessity for many years by the Sloan Foundation, most notably in the creation in 1963 of the Center for Advanced Engineering Study at Massachusetts Institute of Technology. Increasingly, this continuing education is occurring in the places where engineers work, in small groups receiving university instruction through video technology—cable, microwave, or tape—supplemented by printed study guides and textbooks. Currently it is estimated that more than 15,000 engineers each year complete 30 to 45 hours of graduate instruction, for credit, at their job sites.

Twelve university schools of engineering which have been among the most

active in this field have now joined together to expand and strengthen the advanced on-the-job education available to mid-career engineers.

• The Association for Media-Based Continuing Education for Engineers (AMCEE) was organized in 1976 as a result of a series of conferences of engineering educators supported by a small Sloan grant to Colorado State University in 1975. Its original membership of twelve institutions* is expected to grow in a short time to twenty or twenty-five; it is headquartered at Georgia Institute of Technology.

The purposes of AMCEE are to establish a national network of institutions active in its field, to provide a forum for discussion, to coordinate efforts to reach a consensus on standards and use of materials, to provide a clearinghouse for information on available materials, to stimulate production of new materials, and to conduct formative evaluations of courses produced for television-based instruction in engineering. The principal medium to be used is videotape, with supporting print material; tape can be shipped anywhere, it can be replayed and stored by the user, it can be partially revised, and it can be erased and reused as updated courses become available. It also can be used on existing video-based distribution systems.

AMCEE's planners identified as one of its principal needs a revolving fund to supply capital for course production by member institutions. A committee of its board of directors will allocate funds among competing proposals, and those courses which recover their costs, through fees from universities and employers, will return the value of their awards to the revolving fund for investment in production of other courses. To establish this revolving fund the Foundation made a three-year grant of \$250,000, payable to the Georgia Tech Research Institute.

These other grants were approved for Technology in Education activities in 1976:

Dance Notation Bureau, New York, N.Y.	\$12,500
For partial support of development of a computerized system of dance notation.	
Earlham College, Richmond, Ind.	\$15,000
For partial support of a two-year project in computer-assisted instruction in which students will interact with, and help to instruct, one another by means of the computer.	
University of Texas, Austin, Tex.	\$20,000
For a conference in the summer of 1976 on the Keller Plan, a self-paced system of instruction named after the psychologist Fred K. Keller and one of the most widely used such systems in the country.	

* University of California, Davis; Case Western Reserve University, Colorado State University, Georgia Institute of Technology, Illinois Institute of Technology, Massachusetts Institute of Technology, University of Michigan, University of Minnesota, University of South Carolina, University of Southern California, Southern Methodist University, Stanford University.

Neuroscience

The Particular Program in Neuroscience, announced in 1969, awarded its final grants, totaling \$738,300, in 1976. This brought to \$12.2 million the cumulative support provided by the program for development of the emerging field of neuroscience, which now may be said to have become established as a discipline in its own right.

Additionally, some \$900,000 has been awarded in the form of Sloan Research Fellowships for neuroscientists, including \$310,400 for 16 fellowships in 1976 (see Page 25). The Foundation will continue to award Sloan Research Fellowships in neuroscience, and the termination of the Particular Program does not preclude the granting of further support for neuroscience where exceptional opportunities arise. Any such grants would be made under the General Program of the Foundation; funds will no longer be allocated specifically for neuroscience.

President Wessell explained in the Report for 1969 the Foundation's reasons for entering a field which at that time hardly existed in coherent form: "The field is badly in need of special resources if it is to gain rapidly the impetus it requires. Because it is a new field, and does not fit tidily into the established disciplines, many conventional sources of support are closed to it, or are difficult to open. Foundation funds, over a relatively brief period of time, may help establish the field by reducing interdisciplinary barriers and bringing into being new research centers of excellence devoted to neuroscience, and may open to it the substantially greater support from other sources which it will ultimately require."

To a great extent the task undertaken in 1969 has been accomplished. Neuroscience now has firmly established centers of excellence in many leading institutions, and much of what we know about brain function has been learned in the last seven years. The discipline now attracts substantial support for

research and training, although it has shared in the leveling off or outright decline of federal support for basic research in recent years.

While the Foundation cannot possibly replace missing federal dollars one-for-one, its Neuroscience Advisory Committee recommended that some allowance be made for the fact that institutions which launched ambitious neuroscience programs with Sloan's encouragement were finding it more difficult than they expected to replace Foundation support with other funds.

All of the major grants in 1976, therefore, were in the nature of transitional and terminal support intended to ease the adjustment of existing programs to the new fiscal realities. (Similar terminal grants for neuroscience programs at Massachusetts Institute of Technology and the University of Virginia were awarded in 1975.)

Research and Training

The last two years of the Particular Program in Neuroscience have been concentrated on the development of as many young neuroscientists as available funds would permit. Included in this program focus are pre- and postdoctoral fellows and junior faculty.

- The University of California, San Diego (UCSD) conducts a neurobiology program which involves faculty from seven departments, including physics and mathematics as well as the core Department of Neurosciences. Previous Sloan grants, which totaled \$1.47 million, have supported 47 graduate students and assisted 29 postdoctoral fellows. UCSD also has used Sloan funds to help establish the laboratories of ten new young faculty members in the departments of neurosciences, biology, and psychiatry. While much of the program's support now comes from government and other sources, it appeared appropriate to extend Foundation assistance for completion of the training of a number of Sloan-supported pre- and postdoctoral fellows. A two-year grant of \$190,000 was approved.

- At the Albert Einstein College of Medicine of Yeshiva University a major research program in developmental neurobiology was initiated with Sloan support in 1971. This activity led to the creation of a new Department of Neuroscience in 1974. The multidisciplinary research, involving scientists from different departments in a common effort, has been highly productive and has continually opened up new lines of inquiry. The emphasis on collaborative interaction has made parts of the work difficult to fund from conventional sources, however; the Foundation therefore agreed to extend support of \$220,000 for two years. Previous support totaled \$880,000.

- California Institute of Technology in 1971 began a program in behavioral biology embracing studies of chemical and electrical aspects of brain function in four separate laboratories. By 1976 Caltech had built a new Beckman Laboratory of Behavioral Biology and added six new members to the

neuroscience faculty. The Foundation-assisted laboratories had trained 11 new Ph.D.'s; 19 more graduate students were working toward the doctorate, and 17 postdoctoral fellows had participated in the research. Observations by the Foundation staff and by neuroscientists from other institutions indicated that neuroscience has become a flourishing and integrated activity at Caltech. The Institute requested and received a one-year supplemental and terminal grant of \$126,000. Previous Sloan support amounted to \$610,000.

- At Rockefeller University four young scientists—a neuropharmacologist, two physiological psychologists, and a molecular biologist—are investigating the ways in which hormones are related to brain function and behavior. For example, corticosterone, released by the adrenal gland under conditions of stress, acts on certain brain cells in previously unknown ways to produce depression. The Rockefeller group has published 14 papers describing how these cellular events take place. In view of the current difficulty in finding support for younger scientists, the Foundation agreed to extend its support for one year at \$75,000, supplementing a 1973 grant of \$145,000.

International Communication

- Interchange of persons between laboratories has proved a fruitful means of advancing the growth of neuroscience across a broad variety of scientific fronts. Productive approaches and techniques developed in one laboratory can be propagated by this means in other laboratories and indeed across international boundaries. This is the purpose of a formal joint program adopted in 1973 by the University of Pennsylvania and Duke University in cooperation with research institutions in England, Poland, and Italy. Sloan support enables junior neuroscientists to spend a year working with senior scientists in other countries; intermediate-level and senior investigators spend shorter periods with foreign colleagues. Participants have testified to the great value of this cross-fertilization of ideas and were eager to see the exchanges continue. The Foundation agreed to extend renewed support over two years of \$100,000, payable to the University of Pennsylvania. An equal amount was provided in 1973.

Three smaller grants, for the principal purpose of increasing communication among neuroscientists, were awarded in 1976:

Brandeis University, Waltham, Mass.	\$4,500
For a workshop conference on vertebrate neuro-ethology.	
University of California, Los Angeles	\$17,800
For an assessment of manpower in the neurosciences.	
University of Florida, Gainesville, Fla.	\$5,000
For partial support of a conference of directors of interdisciplinary programs in neurobiology and neurobehavioral sciences.	

Other Grants

Twelve smaller grants for purposes other than the foregoing were approved in 1976. Most had some relation to education, and some were classified as civic grants, which are awarded in recognition of the Foundation's obligations as a corporate citizen of New York City and the national community.

Associated Councils of the Arts, New York, N.Y.	\$15,000
To support the consulting assistance of a marketing specialist to develop a pricing and merchandising plan for ACA services.	
Council on Foundations, Inc., New York, N.Y.	\$10,000
For 1976 membership support.	
In support of the 1976-77 speakers' program of the Foundation Luncheon Group.	
Encounter Limited, London, England	\$10,000
Contribution to the emergency fund of <i>Encounter</i> magazine.	
Institute for Architecture and Urban Studies, New York, N.Y.	\$20,000
In support of a survey of endangered designated landmarks in New York City and in partial support of the Institute's training program in preservation and adaptive reuse.	
The Library of Congress, Washington, D.C.	\$20,000
For partial support of the Library's comprehensive review of present and future services.	
University of Michigan, Ann Arbor, Mich.	\$15,000
For partial support of a new Office for Graduate Non-Academic Job Placement.	
Robert R. Moton Memorial Institute, Inc., New York, N.Y.	\$10,000
For partial support of program development at the Moton Conference Center, Capahosic, Va.	
NAACP Legal Defense and Educational Fund, Inc., New York, N.Y.	\$20,000
To assist the Fund in developing a program of deferred giving and bequests.	
New York City Police Foundation, Inc., New York, N.Y.	\$20,000
In support of the New York City Police Academy Library.	
University of Pennsylvania, Philadelphia, Pa.	\$20,000
In support of research on income-contingent student loans.	
Princeton University, Princeton, N.J.	\$5,500
For partial support over two academic years of the <i>Princeton Journal of the Arts and Sciences</i> .	

Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and was incorporated in the state of Delaware. Mr. Sloan, who was for many years the chief executive officer of General Motors Corporation, was active in the affairs of the Foundation until his death in 1966.

The Foundation's basic interests are in science and technology, in economics and management, and in education and problems of society related to those interests. It operates through a General Program and through several Particular Programs, which are designed to concentrate specified resources on a closely defined problem area for a limited period of time.

The Foundation's program interests do *not* extend to religion, the humanities, the creative and performing arts, and medical research except for that conducted at the Sloan-Kettering Institute for Cancer Research. Requests involving activities outside the United States generally are discouraged, and the Foundation does not entertain requests for endowment funds, general support, or buildings, or for equipment which is not directly related to a Foundation-supported project. No grants are made directly to individuals.

Application may be made at any time for support of activities falling within the above guidelines. There are no deadlines and no special application forms except in the Sloan Fellowships for Basic Research. Letters of application usually are addressed to the President of the Foundation, and should state: (1) the specific nature of the problem to be attacked; (2) how the applicant plans to attempt to solve the problem; (3) the name(s) and qualifications of the person(s) to be responsible for the project; and (4) the expected cost and duration of the project. Often a preliminary letter of inquiry will be useful in helping the Foundation staff to determine whether submission of a full proposal would be appropriate.

A grant application should be accompanied by documents indicating the applicant's tax-exempt status and its classification as either a private foundation or a publicly supported organization.

The Foundation is governed by a Board of Trustees assisted by a professional staff. Final disposition of all proposals is the responsibility of members of the Board.

Financial Review



Financial Review

The financial statements and schedules of the Foundation, which have been audited by Haskins & Sells, independent certified public accountants, appear on pages 55 to 69. They include the balance sheet, the statement of income and funds, the statement of changes in financial position, the schedule of administration and investment expenses, the schedule of marketable securities, and the summary and schedule of grants and appropriations.

Investment and other income in 1976 amounted to \$14,363,450, compared with \$10,367,642 in 1975. The increase of \$3,995,808 was due to higher dividend income in 1976. Investment expenses in 1976 totalled \$348,470, of which \$301,736 represented investment counsel fees. Provision for Federal excise tax amounted to \$556,000 in 1976. These deductions from income totalled \$904,470 in 1976, compared with \$732,569 in 1975.

Net investment income was \$13,458,980 in 1976, compared with net investment income of \$9,635,073 in 1975.

The total of grants and appropriations authorized and administration expenses during 1976 amounted to \$13,121,455, or \$337,525 under net investment income of \$13,458,980. Grants and appropriations totalled \$11,912,295 while administration expenses amounted to \$1,209,160. Over the Foundation's forty-two year history, the cumulative excess of grants and expenses over income has amounted to \$56,188,063.

The total of grant and appropriation payments in 1976 was \$12,955,146, compared with \$12,372,536 in 1975. Together with 1976 administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures in 1976 was \$14,912,300, compared with \$14,257,428 in 1975.

The market value of the Foundation's total assets of \$297,704,552 at December 31, 1976, including marketable securities valued at \$297,160,166, compared with total assets of \$256,662,156 at December 31, 1975. A summary of the Foundation's marketable securities at ledger and quoted market value at December 31, 1976 appears on page 59.

A summary of grants by major classifications followed by a listing of grants made during 1976 will be found on pages 64 to 69. Grants and appropriations authorized and payments during the year ended December 31, 1976 are summarized in the following table:

Grants and appropriations authorized but not due at January 1, 1976	\$15,587,124
Authorized during 1976	11,912,295
	<u>27,499,419</u>
Payments during 1976	12,955,146
Grants and appropriations authorized but not due at December 31, 1976	<u>\$14,544,273</u>

The Foundation has a contributory retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund which provides for purchase of annuities for employees. Retirement plan expense was \$100,442 and \$90,513 for 1976 and 1975, respectively.

The Internal Revenue Code imposes an excise tax at the rate of 4% on the net investment income of private foundations. The accompanying financial statements include provision for this tax. No Federal excise tax has been allocated to net gain on disposals of securities added to the principal fund, since the basis for determining gain or loss on disposals of securities under the Code resulted in a net loss for excise tax purposes.

Income from investments credited to the General Motors Dealers Appreciation Fund during 1976, after provision for Federal excise tax, amounted to \$263,889. A grant of \$200,000 to the Sloan-Kettering Institute for Cancer Research was authorized and applied against this Fund, as set forth on page 28. Grant payments from this Fund during the year 1976 amounted to \$600,000, resulting in grants outstanding and unpaid at the end of 1976 of \$800,000.

The net worth of the Foundation at December 31, 1976, based on quoted market values, was divided as follows:

	Total Assets At Market Value	Grants and Appropriations Authorized But Not Due For Payment	Accrued Federal Excise Tax	Fund Balances At Market Value
General Fund	\$292,193,103	\$13,744,273	\$548,225	\$277,900,605
General Motors Dealers Appreciation Fund	5,511,449	800,000	10,719	4,700,730
Total	<u>\$297,704,552</u>	<u>\$14,544,273</u>	<u>\$558,944</u>	<u>\$282,601,335</u>

HASKINS & SELLS
CERTIFIED PUBLIC ACCOUNTANTS

TWO BROADWAY
NEW YORK, NEW YORK 10004

AUDITORS' OPINION

Alfred P. Sloan Foundation:

We have examined the balance sheet of Alfred P. Sloan Foundation as of December 31, 1976 and 1975 and the related statements of income and funds and of changes in financial position for the years then ended. Our examination also comprehended the supplemental schedule of administration and investment expenses for the years ended December 31, 1976 and 1975 and the supplemental schedules of marketable securities at December 31, 1976 and grants and appropriations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements and supplemental schedules present fairly the financial position of the Foundation at December 31, 1976 and 1975 and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Haskins & Sells

January 31, 1977

Balance Sheet

December 31, 1976 and 1975

	<u>1976</u>	<u>1975</u>
Assets		
Marketable Securities:		
Fixed income securities:		
U.S. Government and agency obligations	\$ 35,380,063	\$ 29,387,784
Other	17,382,636	22,011,230
Total fixed income securities	<u>52,762,699</u>	<u>51,399,014</u>
Common stocks:		
General Motors Corporation	44,493,253	44,493,253
Other common stocks	112,110,138	106,971,514
Total common stocks	<u>156,603,391</u>	<u>151,464,767</u>
Total marketable securities (quoted market: 1976—\$297,160,166; 1975—\$256,279,808)	209,366,090	202,863,781
Cash	544,386	382,348
TOTAL	<u>\$209,910,476</u>	<u>\$203,246,129</u>
Obligations and Funds		
Grants and Appropriations Authorized		
But Not Due for Payment	\$ 14,544,273	\$ 15,587,124
Accrued Federal Excise Tax	558,944	402,468
Fund Balances	194,807,259	187,256,537
TOTAL	<u>\$209,910,476</u>	<u>\$203,246,129</u>

Summary of Significant Accounting Policies

The Foundation maintains its accounts on a modified cash basis, which in effect is not materially different from the accrual basis of accounting.

Marketable securities purchased are carried at cost; those received by gift or bequest are carried at quoted market value at date of gift or bequest. Gain or loss on disposal of securities is determined generally on the basis of first-in, first-out cost, but in certain instances the identified certificate basis is used. Net gain or loss on disposals is applied to the principal fund.

Dividend and interest income, and investment expense are recorded on a cash basis. The unrecorded amount of interest and dividends receivable is not material in relation to net assets or fund balances.

Grant appropriations are accrued at the time authorized by the Trustees and the Federal excise tax is accrued in the year to which it relates. There were no significant unpaid administration expenses at either year-end.

Statement of Income and Funds

For the years ended December 31, 1976 and 1975

	<u>1976</u>	<u>1975</u>
INCOME:		
Investment income:		
Dividends	\$ 10,575,393	\$ 6,582,696
Interest	3,746,951	3,755,169
Other	41,106	29,777
	<u>14,363,450</u>	<u>10,367,642</u>
 Less:		
Investment expenses	348,470	332,569
Provision for Federal excise tax	556,000	400,000
	<u>904,470</u>	<u>732,569</u>
Net investment income	<u>13,458,980</u>	<u>9,635,073</u>
 Grants and expenses:		
Grants and appropriations authorized	11,912,295	11,381,366
Administration expenses	1,209,160	1,086,159
Total	<u>13,121,455</u>	<u>12,467,525</u>
 Grants and expenses under (over) income for the year	 337,525	 (2,832,452)
 Cumulative excess of grants and expenses over income from inception to:		
Beginning of year	(56,525,588)	(53,693,136)
End of year	<u>(56,188,063)</u>	<u>(56,525,588)</u>
 PRINCIPAL:		
Balance at beginning of year	243,782,125	246,569,500
Net gain (loss) on disposals of securities	7,213,197	(2,787,375)
Balance at end of year	<u>250,995,322</u>	<u>243,782,125</u>
FUND BALANCES AT END OF YEAR	<u>\$194,807,259</u>	<u>\$187,256,537</u>

See Summary of Significant Accounting Policies on Page 55.

Statement of Changes in Financial Position

For the years ended December 31, 1976 and 1975

	<u>1976</u>	<u>1975</u>
SOURCE OF FUNDS:		
Investment and other income	\$14,363,450	\$10,367,642
Net gain (loss) on disposals of securities	7,213,197	(2,787,375)
	<u>21,576,647</u>	<u>7,580,267</u>
 APPLICATION OF FUNDS:		
Grant and appropriation payments	12,955,146	12,372,536
Administration expenses	1,209,160	1,086,159
Investment expenses	348,470	332,569
Federal excise taxes paid	399,524	466,164
	<u>14,912,300</u>	<u>14,257,428</u>
 INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Change in ledger value of investments	6,502,309	(6,739,950)
Change in cash balances	162,038	62,789
NET CHANGE IN FUNDS	<u>\$ 6,664,347</u>	<u>\$(6,677,161)</u>

See Summary of Significant Accounting Policies on Page 55.

Schedule of Administration and Investment Expenses

For the years ended December 31, 1976 and 1975

	<u>1976</u>	<u>1975</u>
ADMINISTRATION EXPENSES:		
Salaries and employee benefits:		
Salaries	\$ 588,062	\$ 544,467
Employees' retirement plan and other benefits	164,873	143,080
	<u>752,935</u>	<u>687,547</u>
Rent*	212,758	198,219
Program expenses	101,406	94,976
Office expenses and services	118,742	92,290
Reports and publications	28,920	25,133
Auditing and legal	41,133	28,284
Total administration expenses	1,255,894	1,126,449
Less: Allocation of administration expenses applicable to investments	46,734	40,290
Balance of administration expenses applicable to grant making	<u>\$1,209,160</u>	<u>\$1,086,159</u>
INVESTMENT EXPENSES:		
Investment counsel fees	\$ 301,736	\$ 292,279
Allocation of administration expenses applicable to investments	46,734	40,290
Total investment expenses	<u>\$ 348,470</u>	<u>\$ 332,569</u>

* The Foundation occupies office facilities under a lease which expires April 30, 1985 and provides for annual rentals, including real estate taxes and operating expenses, of approximately \$205,000 for 1977, net of approximately \$30,000 rental from sublease.

Schedule of Marketable Securities

December 31, 1976

SUMMARY	Ledger Amount	Quoted Market Value	
		Amount	Percent of Total Investment
Fixed income securities:			
U.S. Government and agency obligations	\$ 35,380,063	\$ 36,372,186	12.2%
Other	17,382,636	17,503,928	5.9
Total fixed income securities	<u>52,762,699</u>	<u>53,876,114</u>	<u>18.1</u>
Common stocks:			
General Motors Corporation	44,493,253	89,542,281	30.1
Other common stocks	112,110,138	153,741,771	51.8
Total common stocks	<u>156,603,391</u>	<u>243,284,052</u>	<u>81.9</u>
Total marketable securities	<u>\$209,366,090</u>	<u>\$297,160,166</u>	<u>100.0%</u>
FIXED INCOME SECURITIES			
U.S. Government and Agency Obligations:	Principal Amount	Ledger Amount	Quoted Market Value
Treasury Notes:			
6.25%—February 15, 1978	\$2,500,000	\$ 2,509,766	\$ 2,532,800
7.125%—May 31, 1978	1,000,000	1,004,687	1,025,620
7.875%—May 15, 1979	1,080,000	1,101,600	1,134,670
6.875%—May 15, 1980	1,400,000	1,377,687	1,443,302
9.00%—August 15, 1980	1,000,000	1,057,500	1,095,620
7.375%—May 15, 1981	2,100,000	2,088,187	2,199,078
8.00%—May 15, 1982	2,500,000	2,557,188	2,687,500
8.00%—February 15, 1983	1,000,000	1,006,563	1,078,750
7.875%—May 15, 1986	3,252,000	3,520,017	3,496,908
Federal Home Loan Banks Consolidated Bonds			
7.75%—February 25, 1980	1,300,000	1,301,219	1,356,875

Schedule of

December 31, 1976 (Continued)

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Twelve Federal Land Banks Consolidated Bonds:			
7.50%—July 20, 1977	\$1,090,000	\$ 1,081,485	\$ 1,103,625
5.125%—April 20, 1978	500,000	416,250	496,250
7.15%—July 23, 1979	2,000,000	1,934,375	2,062,500
7.30%—October 20, 1982	1,000,000	1,007,500	1,033,750
Federal National Mortgage Association Debentures:			
5.20%—January 19, 1977	3,000,000	3,011,250	2,996,250
7.85%—September 12, 1977	1,000,000	1,004,375	1,017,500
7.85%—June 11, 1979	1,000,000	1,018,438	1,045,000
7.05%—March 10, 1981	1,100,000	1,034,000	1,124,750
7.25%—June 10, 1981	300,000	297,656	309,375
6.65%—June 10, 1982	1,000,000	1,002,500	1,003,750
6.05%—February 1, 1988	1,000,000	996,250	918,750
7.00%—March 10, 1992	5,350,000	5,051,570	5,209,563
Total U.S. Government and agency obligations		<u>35,380,063</u>	<u>36,372,186</u>
Other:			
Undivided interest in demand notes:			
Atlantic Richfield Company	89,000	89,000	89,000
General Electric Company	1,233,000	1,233,000	1,233,000
Household Finance Corporation Sinking Fund Debentures			
4.625%—January 15, 1977	1,015,000	870,118	974,806
Citibank, N.A. certificate of deposit			
5.40%—April 19, 1977	300,000	300,000	300,534

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Morgan Guaranty Trust Company of New York Capital Notes			
6.375%—April 1, 1978	\$1,000,000	\$ 1,000,000	\$ 1,004,460
Bankers Trust New York Corporation Debentures			
6.375%—September 1, 1978	1,000,000	997,500	1,003,100
General Electric Credit Corporation Notes			
7.00%—February 15, 1979	2,000,000	1,995,000	2,032,500
General Motors Acceptance Corporation Debentures:			
5.00%—September 1, 1980	1,300,000	1,300,000	1,248,000
5.00%—March 15, 1981	1,500,000	1,492,500	1,438,125
American Telephone and Telegraph Company Debentures:			
4.375%—April 1, 1985	1,500,000	1,518,210	1,290,000
8.75%—May 15, 2000	2,500,000	2,502,188	2,675,000
Aluminum Company of Canada, Limited Sinking Fund Debentures			
9.50%—March 1, 1995	1,000,000	1,012,500	1,031,250
International Paper Company Sinking Fund Debentures			
8.85%—March 15, 1995	1,500,000	1,553,750	1,612,500
Dow Chemical Company Debentures			
8.875%—May 1, 2000	1,474,000	1,518,870	1,571,653
Total other		<u>17,382,636</u>	<u>17,503,928</u>
Total fixed income securities		<u>\$52,762,699</u>	<u>\$53,876,114</u>

Schedule of

December 31, 1976 (Continued)

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Alcon Laboratories, Inc.	51,000	\$ 1,811,451	\$ 1,160,250
Aluminum Company of America	83,000	3,675,225	4,751,750
American Telephone and Telegraph Company	30,000	1,595,517	1,905,000
Baltimore Gas and Electric Company	50,000	1,389,649	1,337,500
BankAmerica Corporation	72,200	1,633,425	2,184,050
Caterpillar Tractor Co.	60,000	1,356,699	3,480,000
Champion International Corporation	66,000	1,770,638	1,806,750
Cincinnati Milacron Inc.	41,000	1,418,919	1,419,625
Citicorp	46,000	1,524,025	1,506,500
Coca-Cola Company	27,000	2,165,920	2,133,000
Continental Corporation	44,500	2,116,023	2,436,375
Dow Chemical Company	60,200	1,630,311	2,611,175
Eastman Kodak Company	86,154	2,369,357	7,409,244
Ex-Cell-O Corporation	60,000	1,242,824	1,545,000
Exxon Corporation	88,334	2,355,534	4,736,911
First Bank System, Inc.	40,000	1,891,325	1,770,000
First Chicago Corporation	72,456	753,105	1,657,431
First International Bancshares, Inc.	43,000	1,625,104	1,865,125
General Electric Company	50,000	2,287,451	2,781,250
General Motors Corporation	1,140,666	44,493,253	89,542,281
General Reinsurance Corporation	9,000	1,893,850	1,728,000
Halliburton Company	30,000	932,276	1,953,750
Hewlett-Packard Company	15,000	1,414,022	1,308,750
Illinois Power Company	113,000	2,895,392	3,107,500
International Business Machines Corporation	70,280	5,787,540	19,616,905
International Flavors & Fragrances Inc.	54,060	1,921,575	1,196,078
Johnson & Johnson	25,000	2,108,770	1,950,000
S. S. Kresge Company	70,000	2,057,103	2,852,500
Eli Lilly and Company	33,000	2,048,917	1,571,625
Lowe's Companies, Inc.	59,400	2,301,650	1,782,000
Marsh & McLennan Companies, Inc.	20,000	954,182	1,135,000

Marketable Securities

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Masonite Corporation	72,000	\$ 1,745,298	\$ 1,764,000
Merck & Co., Inc.	30,000	396,211	2,043,750
Mobil Corporation	47,000	1,419,765	3,055,000
Monsanto Company	35,000	2,407,950	3,084,375
J. P. Morgan & Co. Incorporated	70,000	1,310,880	3,937,500
J. C. Penney Company, Inc.	59,400	3,696,036	3,125,925
Perkin-Elmer Corporation	56,000	1,326,229	1,176,000
Philip Morris Incorporated	55,000	2,990,861	3,396,250
Pittston Company	39,000	1,544,158	1,389,375
Procter & Gamble Company	33,000	633,201	3,089,625
Ralston Purina Company	65,000	2,707,620	3,453,125
Revlon, Inc.	38,000	1,341,109	1,686,250
Roadway Express, Inc.	55,120	2,447,437	2,480,400
Schering-Plough Corporation	26,000	1,857,586	1,163,500
Jos. Schlitz Brewing Company	54,000	2,141,719	978,750
Schlumberger Limited	28,400	796,166	2,737,050
Sears, Roebuck and Co.	43,805	1,172,779	3,022,545
Skaggs Companies, Inc.	100,000	1,470,803	2,275,000
Southeast Banking Corporation	45,760	1,139,144	509,080
Southern Railway Company	42,000	2,445,091	2,604,000
Squibb Corporation	51,000	2,305,438	1,504,500
Standard Oil Company (Ohio)	39,000	2,251,618	2,993,250
Superior Oil Company	10,000	2,593,908	2,370,000
Union Camp Corporation	49,500	2,204,762	3,297,938
Union Carbide Corporation	41,300	2,647,509	2,555,438
United States Steel Corporation	62,250	2,622,643	3,096,938
Warner & Swasey Company	55,000	1,450,615	1,677,500
Weyerhaeuser Company	20,000	543,799	930,000
Wisconsin Public Service Corporation	76,100	1,572,024	1,645,663
Total common stocks		156,603,391	243,284,052
Total fixed income securities		52,762,699	53,876,114
Total marketable securities		\$209,366,090	\$297,160,166

Summary of Grants and Appropriations

	Authorized But Not Due December 31, 1975	Changes During 1976		Authorized But Not Due December 31, 1976
		Authorized	Payments	
Major Grants to colleges and universities	\$ 7,918,316	\$ 7,468,950	\$ 7,917,616	\$ 7,469,650
Other Major Grants:				
American Association for the Advancement of Science	—	\$100,000	—	\$ 100,000
American Council on Education	\$ 100,000	—	\$ 50,000	50,000
American Enterprise Institute for Public Policy Research	—	500,000	100,000	400,000
Brookings Institution	500,000	—	200,000	300,000
Cold Spring Harbor Laboratory	110,000	—	—	110,000
Engineers' Council for Professional Development, Inc.	75,000	90,000	165,000	—
Lincoln Center for the Performing Arts, Inc.	—	189,000	39,000	150,000
Marine Biological Laboratory	53,000	—	27,000	26,000
Memorial Sloan-Kettering Cancer Center	1,500,000	—	500,000	1,000,000
NAACP Legal Defense and Educational Fund, Inc.	20,000	—	20,000	—
National Bureau of Economic Research, Inc.	—	250,000	100,000	150,000
National Federation of the Blind Inc.	—	100,000	75,000	25,000
National Fund for Minority Engineering Students	600,000	—	300,000	300,000
National Medical Fellowships, Inc.	150,000	—	150,000	—
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)	—	125,000	—	125,000
Salk Institute	115,000	—	115,000	—
Sloan-Kettering Institute for Cancer Research	1,200,000	200,000	600,000	800,000
TOTAL OTHER MAJOR GRANTS	4,423,000	1,554,000	2,441,000	3,536,000
Appropriations:				
Sloan Fellowships for Basic Research (177 fellowships at 75 educational institutions)	2,328,492	1,558,800	1,557,892	2,329,400
Officer Grants	781,000	747,618	778,618	750,000
Book Program	—	350,000	29,806	320,194
Other Grants and Appropriations (none over \$100,000 in 1976)	136,316	232,927	230,214	139,029
TOTAL GRANTS AND APPROPRIATIONS	\$15,587,124	\$11,912,295	\$12,955,146	\$14,544,273

Schedule of

	Authorized	Changes During 1976		Authorized
	But Not Due Dec. 31, 1975	Authorized	Payments	But Not Due Dec. 31, 1976
American Assembly		\$ 20,000	\$ 20,000	
American Association for the Advancement of Science		121,460	21,460	\$ 100,000
American Council on Education	\$ 100,000		50,000	50,000
American Economic Association		20,000	20,000	
American Enterprise Institute for Public Policy Research		500,000	100,000	400,000
American Institute of Physics		50,000	50,000	
Arizona, University of		49,200	24,600	24,600
Associated Councils of the Arts		15,000	15,000	
Baruch College Fund		20,000	20,000	
Bentley College		20,000	20,000	
Boston University	8,109		8,109	
Bowdoin College		19,400	9,700	9,700
Brandeis University		4,500	4,500	
British Columbia, University of		14,800	7,400	7,400
Brookings Institution	500,000		200,000	300,000
California, University of	566,163	464,477	611,140	419,500
California Institute of Technology	218,071	175,000	248,571	144,500
Carnegie-Mellon University	208,109	350,000	208,109	350,000
Case Western Reserve University	348,109		213,109	135,000
Catalyst Inc.		20,000	20,000	
Center for Short-Lived Phenomena	20,000		20,000	
Chicago, University of	159,962	90,223	144,685	105,500
Claremont University Center		60,000	60,000	
Clark University	83,000		58,000	25,000
Clarkson College of Technology	9,611		9,611	
Cold Spring Harbor Laboratory	110,000			110,000
Colorado, University of	17,720	81,180	79,500	19,400
Colorado State University		34,400	17,200	17,200
Columbia University	339,962	39,000	291,862	87,100
Consortium for Graduate Study in Management	50,000		50,000	
Cornell University	208,612	36,600	106,912	138,300
Council on Foundations, Inc.	20,000	17,500	37,500	
Dance Notation Bureau		12,500	12,500	
Dartmouth College		370,000	111,000	259,000
Duke University	287,500	69,383	169,383	187,500
Earlham College		15,000	15,000	
East Asian History of Science Trust		20,000	20,000	
Educational Change, Inc.		20,000	20,000	
Encounter Limited		10,000	10,000	
Engineers' Council for Professional Development, Inc.	75,000	90,000	165,000	
Florida, University of	8,650	43,800	33,050	19,400
Florida Agricultural and Mechanical University		100,000	50,000	50,000

Grants and Appropriations

	Authorized	Changes During 1976		Authorized
	But Not Due Dec. 31, 1975	Authorized	Payments	But Not Due Dec. 31, 1976
Florida State University	\$ 8,109		\$ 8,109	
Fordham University	8,109		8,109	
Foundation Center	40,000		40,000	
Freedom House, Inc.		\$ 7,500	7,500	
George Washington University	120,000		60,000	\$ 60,000
Georgia, University of		20,000	20,000	
Georgia Tech Foundation, Inc.		500,000		500,000
Georgia Tech Research Institute		250,000	100,000	150,000
Harvard University	328,928	179,315	393,643	114,600
Hawaii, University of	8,109		8,109	
Howard University	105,000		105,000	
Illinois, University of	17,720	14,800	25,120	7,400
Indiana University		14,800	7,400	7,400
Institute for Architecture and Urban Studies		20,000	20,000	
International Baccalaureate North America		16,000	16,000	
Iowa State University		14,800	7,400	7,400
Johns Hopkins University	9,611	32,000	25,611	16,000
Kansas State University	8,109		8,109	
Library of Congress		20,000	20,000	
Lincoln Center for the Performing Arts, Inc.		189,000	39,000	150,000
Louisiana State University	8,109		8,109	
Marine Biological Laboratory	61,650		35,650	26,000
Marquette University	40,000	75,000	40,000	75,000
Massachusetts, University of	100,000		100,000	
Massachusetts Institute of Technology	532,531	1,548,400	1,228,231	852,700
Memorial Sloan-Kettering Cancer Center	1,500,000		500,000	1,000,000
Miami, University of		62,000	62,000	
Michigan, University of	9,611	85,389	15,000	80,000
Michigan State University	172,109	32,000	188,109	16,000
Middlebury College		17,200	8,600	8,600
Minnesota, University of	18,090	17,200	26,690	8,600
NAACP Legal Defense and Educational Fund, Inc.	20,000	20,000	40,000	
National Academy of Sciences		81,550	15,000	66,550
National Bureau of Economic Research, Inc.	35,000	250,000	135,000	150,000
National Federation of the Blind Inc.		100,000	75,000	25,000
National Fund for Minority Engineering Students	600,000		300,000	300,000
National Medical Fellowships, Inc.	150,000		150,000	
Nebraska, University of	9,981		9,981	
New Mexico, University of	255,700		110,000	145,700
New York City Police Foundation, Inc.		20,000	20,000	

Schedule of

(Continued)

	Authorized	Changes During 1976		Authorized
	But Not Due Dec. 31, 1975	Authorized	Payments	But Not Due Dec. 31, 1976
New York Institute of Technology	\$ 87,500		\$ 87,500	
New York University	210,000		210,000	
North Carolina, University of	205,109		138,109	\$ 67,000
North Dakota State University		\$ 8,857	8,857	
Northeastern University	9,611		9,611	
Northwestern University	358,109	414,650	366,709	406,050
Notre Dame, University of		450,000	50,000	400,000
Ohio State University	9,611	14,800	17,011	7,400
Oregon, University of	8,109		8,109	
Pennsylvania, University of	18,631	120,000	88,631	50,000
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)		125,000		125,000
Pittsburgh, University of	8,109	14,800	15,509	7,400
Polytechnic Institute of New York	350,000	10,000	210,000	150,000
Princeton University	397,331	356,100	515,631	237,800
Public Communication Foundation for North Texas		20,000	20,000	
Purdue University	197,611	32,000	95,611	134,000
Research Foundation of The City University of New York	68,090	16,125	84,215	
Research Foundation of State University of New York	18,261	899,200	620,361	297,100
Rice University	8,109	36,600	26,409	18,300
Robert R. Moton Memorial Institute, Inc.		10,000	10,000	
Rochester, University of	200,000	29,600	174,800	54,800
Rockefeller University	16,759	113,800	111,159	19,400
Rollins College	35,000		35,000	
Rutgers University	8,109	36,600	26,409	18,300
Salk Institute	115,000	19,400	124,700	9,700
SIAM Institute for Mathematics and Society		88,000	30,000	58,000
Sloan-Kettering Institute for Cancer Research	1,200,000	200,000	600,000	800,000
Southern California, University of	9,981	14,800	17,381	7,400
Southern Methodist University	250,000		125,000	125,000
Spence School	150,000		150,000	
Stanford University	367,293	834,800	334,693	867,400
Syracuse University		150,000		150,000
Tennessee, University of		19,400	9,700	9,700
Texas, University of	30,962	259,517	131,479	159,000
Texas A&M University		17,200	8,600	8,600
Toronto, University of	9,981		9,981	
University Centers for Rational Alternatives, Inc.		20,000	20,000	
Utah, University of	8,109		8,109	
Vanderbilt University	176,500		122,500	54,000

Grants and Appropriations

	Authorized	Changes During 1976		Authorized
	But Not Due Dec. 31, 1975	Authorized	Payments	But Not Due Dec. 31, 1976
Virginia, University of	\$ 158,000		\$ 87,000	\$ 71,000
Washington, University of		\$ 46,800	23,400	23,400
Washington University	362,950	38,800	232,350	169,400
Wayne State University		32,000	16,000	16,000
Western Institute for Science and Technology		19,800	19,800	
Western Ontario, University of	8,109		8,109	
William and Mary, College of		32,000	16,000	16,000
Wisconsin, University of	156,218	19,400	95,918	79,700
Worcester Polytechnic Institute	114,000		103,000	11,000
Yale University	409,592	291,789	255,681	445,700
Yeshiva University		220,000	110,000	110,000
Sloan Fellowships for Basic Research to be granted in ensuing year	1,550,000			1,550,000
Officer Grant appropriation for grants in ensuing year	750,000			750,000
Book Program		350,000	29,806	320,194
Other appropriations for grants and related expenses	41,316	28,377	55,214	14,479
	<u>15,587,124</u>	<u>11,970,592</u>	<u>13,013,443</u>	<u>14,544,273</u>
Reduction for Grant Transfers		58,297	58,297	
TOTAL GRANTS AND APPROPRIATIONS	<u>\$15,587,124</u>	<u>\$11,912,295</u>	<u>\$12,955,146</u>	<u>\$14,544,273</u>

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Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr. (1875-1966)

Report for 1977

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President's Statement



President's Statement

The great bulk of Sloan Foundation grants goes to American colleges and universities. The approximately 15% that does not assists institutions closely related to higher education. The range of institutions in type, size, and location is exceedingly broad, from complex and comprehensive universities to small liberal arts colleges and community colleges, from neighboring urban New York City institutions to institutions thousands of miles away.

From all of these centers we have been hearing expressions varying from concern to frustration to disbelief regarding the enlarging influence of government on their affairs. The mutually beneficial relationship between government and higher education characteristic of the years immediately following World War II has given way to an atmosphere of friction and confrontation. Growing involvement of the government with higher education is producing growing tensions. These tensions affect not only the colleges and universities themselves but the many agencies of government dealing with education, with defense, and with social policies. Courts are increasingly involved.

Observing this worsening situation in its daily activities, the Sloan Foundation was persuaded that efforts were critically needed to effect, if possible, a creative reconciliation between these two important institutions, government and education. A national Commission of able and distinguished individuals to consider the issues was deemed to be the most promising approach. The Trustees of the Foundation created such a Commission and provided it with funds for staff, consultants, and research assistance and charged it with the important task of finding a way toward such a reconciliation. The members of the Commission were appointed by the Foundation and are listed on page 35 of this Annual Report.

The Commission is an independent and autonomous body. The Foundation will provide the funds and offer its good offices, but the Commission's

report, when it is issued eighteen months or more from now, will be that of the Commission alone. The Commission's charge is to serve the general public interest. It does not represent the academic community arrayed against government, or government against the academic community. The Foundation will in no way impose its own views on those who have agreed to do the job. The Commission is arbiter and wise counsel, not the proponent of one side only.

The Commission attempted at its first meeting in November of 1977 to identify in broad terms the issues with which it must deal and which it must attempt to resolve.

Five such issues were put before the Commission by its Chairman and Vice Chairman. Others will emerge as the work of the Commission proceeds. At this time, however, these five appear clearly fundamental and may well represent the major issues which the Commission addresses in its final report.

The first issue concerns the question of *how* the government has become involved in higher education and *why* it should continue to pay for it. Before World War II the role of government was modest to the point of being minuscule. During the war university science and technology were drawn into close relation to the military. This occurred again during the Cold War; at the same time a drive began to democratize higher education and to direct the resources of higher education toward furthering a wide range of social programs. Universities expanded enormously with little careful analysis of where it was all leading.

A second issue is that often referred to as "elite versus mass education." That shorthand in many ways suggests an oversimplification of the presumed competition, but it is of some interest that as we experience an egalitarian drive for education, the Federal government allocates 75% of its funds to fewer than 5% of the institutions of higher education. What are the consequences?

The third is the issue of uniformity versus diversity. Seventy-five per cent of students are enrolled in public institutions, many of which are very large and subjected to great pressure, both positive and negative, with respect to both financing and programs. Does being responsive and responsible to government at all levels create a kind of homogeneity or leveling which is undesirable, a pall of uniformity over higher education as a whole?

The fourth issue addresses the question of the responsibility of government in a time of excess capacity within many areas in the academic community, an excess capacity which the government itself to a large degree helped to create. While much of that excess demand has receded, the institutions and facilities created to serve that demand endure. Graduates with doctoral degrees continue to be turned out in numbers greater than the jobs awaiting them. Government stimulus has contributed to this state of affairs.

The final issue is probably the least tangible. It is a consequence of the combination of massive government patronage of higher education and the

related growing impulse on the part of government to regulate the recipients. What will the combination of these two forces do to the autonomy of higher education and to its traditional control over admissions, appointments, curriculum and research? What have they already done? What will they do to the vigor of independent critical thought within the universities on social, political, aesthetic and ultimately moral issues?

The members of the Commission have already made plain that they will not accept a bias in favor of the academic community's view of the problems as they begin their deliberations. The staff was enjoined to gather analytic material that clearly states the government viewpoint, thus complementing their earlier studies which were completed in advance of the first meeting of the Commission and which provided material expressing the academic viewpoint. The Commission insists that institutions of higher education be subject to the same scrutiny as other institutions in our society, such as business and labor unions.

The Commission has received pledges of cooperation and assistance from both government agencies and institutions of higher education. The Commission will be meeting at regular intervals over the next eighteen months; the staff will be at work full time during that entire period.

I cannot conclude this report without expressing my appreciation for the contributions being made to the work of the Commission by its chairman, Louis W. Cabot, Chairman of the Board of the Cabot Corporation in Boston, and its vice chairman, Professor Carl Kaysen of the Massachusetts Institute of Technology. The commitment and the involvement of these two individuals are the best possible augury with respect to the successful completion of the Commission's work and the issuance of a significant, objective report in the public interest. Dr. Kaysen is the full time Director of Research for the Commission. The work of the Commission is well begun.

January 1978

Wesley C. Mitchell

General and Particular Programs

The Foundation divides its resources between its General Program, which carries forward its established interests in science and technology, economics and management, and related matters; and a set of Particular Programs, which focus on specific problem areas for limited periods of time. A typical Particular Program involves an expenditure of \$10 million to \$15 million over five to seven years.

In a normal year three Particular Programs are in operation and they account for about 40 per cent of the Foundation's expenditures. Only two, however, were active in 1977. These were the programs in Minority Engineering Education and in Cognitive Sciences, which began in 1977. Two Particular Programs terminated at the end of 1976. Previous Particular Programs dealt with Minorities in Medicine and Management, Technology in Education, and Neuroscience. Exploration of possible new Particular Programs is continuing in 1978.

The Foundation hopes, of course, that activities which were stimulated by Particular Programs now expired will commend themselves to other sources of support, if they warrant continuation. However, such activities may still receive Foundation support in exceptional cases, through the General Program.

General Program



Education for the Public Service

1977 was, among other things, a year in which the nation watched a new administration in Washington wrestle with accumulated problems of public policy in such areas as energy, taxation, social welfare, transportation, environmental protection, economic growth, and military preparedness. The need for rigorous and systematic analysis of these and other complex issues was never more evident.

Many young persons seem eager to equip themselves to undertake such tasks, and many institutions are eager to help them prepare themselves. The Foundation made known in its Report for 1976 its interest in programs of education for the public service, and the response from colleges and universities was immediate. Proposals funded during 1977 came to a total of \$1.7 million.

While graduate professional schools of various kinds (engineering, management, public policy, public administration, and others) have taken the lead in efforts to educate a new generation of policy analysts and decision makers, there is growing interest in making some of the requisite skills accessible to students at the undergraduate level. This situation was reflected in the pattern of Sloan grants during 1977.

Graduate Programs

- Technological considerations are significant if not dominant in a great many issues of public policy, including most of those cited in the first paragraph of this section. Yet technology and its implications for policy may remain largely a mystery to future policy analysts trained primarily in the social sciences. The University of Denver is moving to incorporate into its graduate program in policy analysis a set of new courses and seminars which will equip social scientists to deal with technological problems.

The goal of the revised program at Denver will be not to convert social

scientists into technologists, but rather to give them an understanding of systems analysis, mathematical modeling, and other techniques employed by technologists. One course will acquaint students with the characteristics of engineers and the process by which an engineering project progresses from the feasibility stage to design and execution. Case studies in the planning, management, and control of large technological projects will be employed, and students will be expected to develop skill in identifying and evaluating alternative technological solutions to societal problems. They will also participate in an internship program in state and local government and in private industry.

To develop these new courses and seminars, the University has assembled an interdisciplinary team of engineers, scientists, and social scientists from its Graduate School of International Studies, the Graduate School of Business Administration, and the Denver Research Institute. The Foundation made a four-year grant of \$298,000 to the University of Denver to support this work.

- In a further effort to improve the technological content of education for the public service, a joint project of Duke University and the Rand Graduate Institute is commissioning a series of case studies by leading scholars of public-policy problems in which technological change or opportunity is a paramount factor. The Public Policy Curricular Materials Development Program, established with Ford Foundation support, also will conduct workshops for public-policy faculty members to introduce and evaluate these and other materials, and to disseminate information about them more widely. The materials will be made available for both graduate and undergraduate public-policy courses.

This program is a cooperative activity of Duke University's Institute of Policy Sciences and Public Affairs and of the Rand Graduate Institute, a degree-granting academic unit of the Rand Corporation. The Foundation made a two-year, \$250,000 grant to the Rand Corporation for its support.

- Management of state and local governments, which face some of the most pressing domestic problems, may be strengthened in years to come by graduates of the Public Management Program of Boston University's School of Management. The program, now in its third year, is attracting students of unusually high caliber and is generating new curricular materials, focused on problems peculiar to states and municipalities, which are being adopted by such universities as Yale, Duke, and Massachusetts Institute of Technology. It is the only graduate program in public management known to be oriented almost entirely toward state and local government. Many of its students hold or have held upper-level positions in state and city agencies and departments; their average age is about 30.

The Public Management Program thus far has operated on a modest scale with a core faculty of five, all experienced in government, and about 50 students over the first two years of the two-year program. Based on this

experience, the School of Management proposed the redesign and testing of eight core courses and the creation of new elective courses. It also saw a need for more program faculty members in economics, organizational behavior, marketing, and financial management.

For partial support of the proposed increase in faculty the Foundation made a three-year grant of \$172,500 to Boston University.

Undergraduate Programs

- Students at Tulane University soon will be able to earn a Bachelor of Arts degree with a major in public policy. Tulane views public policy studies as a field in which liberal education can be blended with the professionally oriented education which students increasingly are demanding. Its public policy program will be organized and directed by a new Center for Public Policy Studies, which will have its own core faculty and will draw upon faculty from other disciplines such as political science, economics, and sociology. A grounding in quantitative and verbal skills and some basic knowledge of economics and political science will be required of students adopting the public-policy major, and new courses in such subjects as policy analysis and policy evaluation will be added. Internships in policy-oriented public or private organizations will help students relate their academic work to actual experience in the field.

Courses and facilities of Tulane's Graduate School of Business Administration, School of Social Work, and School of Tropical Medicine also will be available to undergraduate public policy majors. For the first 2½ years of development of the program, the Foundation granted \$350,000. Tulane expects in time to add a graduate program in public policy.

- Williams College has experienced growing student interest in the policy issues dealt with in its established political economy program. It proposed to strengthen the public-policy strand of this program by adding courses in public policy processes and comparative political-economic systems, in order to deepen students' understanding of the means by which the American and other governments arrive at decisions. Williams also plans to expand the number of summer internships for political economy majors in government and public-interest agencies, and to add a limited number of visiting speakers experienced in policy matters to certain courses. The Foundation made a three-year grant of \$165,000 to support these developments.

- Swarthmore College is developing a public-policy concentration for students in economics, engineering, and political science, with other disciplines possibly to be added later. Swarthmore already has some policy-oriented courses such as a health policy course, taught jointly by an economist and a political scientist, and an energy policy course, taught by an engineer and an economist. To these it will add more interdepartmental courses, cast in the



Washington University's Department of Technology and Human Affairs will begin offering an undergraduate degree in engineering and public policy with Sloan assistance. Dr. Robert P. Morgan, the Department's chairman, confers with students in the existing graduate-level program in technology and human affairs.

form of seminars for advanced undergraduates who have taken the necessary prerequisites, and an internship program. A three-year Sloan grant of \$165,000 will assist the initial implementation of Swarthmore's plans.

- Washington University's Program in Technology and Human Affairs, assisted by a 1974 Sloan grant, has achieved the status of a department of the School of Engineering and Applied Science; it offers master's and Ph.D. degrees with emphasis on public policy and the social aspects of engineering, and provides courses in its field to students throughout the University. The Department of Technology and Human Affairs now will offer an undergraduate degree in engineering and public policy which will require substantial study of economics, political science, and other non-engineering subjects. The Department expects that graduates of the new program will have developed an interest in problems of state and local government, and that some of them will take a hand in solving them. The Foundation made a three-year grant of \$150,000 to Washington University to support curriculum development and additional faculty.

- The value of working internships for testing classroom and textbook knowledge against "real world" experience is recognized in nearly all of the programs of education for the public service discussed thus far. But organizing and supervising internship programs worthy of academic credit is beyond the

means of many small colleges. The Washington Center for Learning Alternatives, less than three years old, performs this function for them. For \$700 a semester, usually paid by the colleges, students work in Congressional and Executive-branch offices or in public-interest organizations, participate in seminars related to their work assignments, and hear speakers on topical subjects at evening assemblies, while living in a Washington apartment building leased by the Center. By the fall of 1977, some 210 students from 180 colleges were participating, and further growth is expected.

William M. Burke, the founder and director of the Washington Center for Learning Alternatives, felt a need as the program grew for strengthening its academic components, for defining its objectives more precisely, and for assessing more rigorously its contribution to students' development. For these and other purposes the Center proposed to engage a full-time academic coordinator and to recruit a panel of scholars who would constitute an academic advisory committee for consultation on selection of part-time faculty members, internship opportunities, and the structure of the seminar program. A Sloan grant of \$35,000 will support these activities for one year, after which the Center expects to pay for them out of income.

- An undergraduate public-policy program at Stanford University is being planned with the aid of a 1977 Sloan grant of \$32,500. Stanford is examining various approaches, including a bachelor's degree in an existing major with a strong minor in public policy; a five-year program leading to a bachelor's degree in an existing discipline and a master's degree in public policy; and a new major in public policy.

These other grants were approved in 1977 for activities related to education for the public service:

Booker T. Washington Foundation, Washington, D.C.	\$20,000
For planning the development of an educational program in public policy for minorities.	
Brandeis University, Waltham, Mass.	\$20,000
For curriculum planning for a new master's degree program in human services management at the Florence Heller Graduate School for Advanced Studies in Social Welfare.	
Education Development Center, Newton, Mass.	\$19,950
For preliminary work on a book on federal government education policy, by Jerrold R. Zacharias and Saville Davis.	
Harvard University, Cambridge, Mass.	\$20,000
In support of research on public-sector personnel by Professor John T. Dunlop.	
New York University, New York, N.Y.	\$10,000
For a special issue of <i>New York Affairs</i> on public-policy priorities for the New York region.	

Economics and Management

A broad spectrum of activities in economics and management received support through Sloan grants totaling about \$2.2 million in 1977. New research projects on issues of national policy were launched, and two more universities received support for research and training in microeconomics. Special programs to enhance the preparation of municipal and women managers and of minority economists were supported. Four grants were made to strengthen relationships linking the discipline of economics to the law, to journalism, to the financial community, and to the public.

Economics Research

- The University of Chicago in 1977 established a Center for the Study of the Economy and the State, bringing together a number of scholars from its law and business schools and its Department of Economics who have done important work on the interactions of the economic, legal, and political systems. The Center's director is Professor George J. Stigler of the Department of Economics and the Graduate School of Business. Others associated with the Center include Gary S. Becker and Milton Friedman (economics), Kenneth W. Dam, William M. Landes, and Richard A. Posner (law), and B. Peter Pashigian and Sam Peltzman (business). Scholars from other parts of the University and from other institutions may join the Center to work on problems in their specialized fields of interest.

The Center's focus will be on the impact of legal and political institutions on economic activity, on the forces that act to change those institutions, and on the potential effects of alternative forms of such institutions. The Center will not seek to influence public policy, although its findings may contribute information to policy debates.

The Sloan Foundation was asked to support three specific research studies

at the Center for the Study of the Economy and the State. They are: (1) the law and economics of privacy; (2) consumer competence and consumer protection; and (3) tenure and compensation in political life. The Foundation made a three-year grant of \$300,000 to the University of Chicago for support of this research.

- The Brookings Institution through its Economic Studies Program is undertaking four new studies on topics of major current concern in the economics of labor and compensation. All have a direct bearing on immediate policy problems.

One Brookings project will study the impact of collective bargaining on wages and inflation since the mid-1950's. Its major purpose will be to help provide the basis for public policies to promote non-inflationary wage behavior in labor markets. A study of compensation for federal civilian employees will analyze how this rapidly rising component in the cost of government is now determined, and will evaluate proposals for changing the present federal pay system. Another study will consider the effects of a proposed increase in the age of mandatory retirement on productivity, on younger groups of workers, on Social Security and private pension systems, and on the mental and physical health of older workers. The fourth project will deal with the impact of American international economic policy on patterns of domestic employment and unemployment.

The Foundation made a three-year grant of \$300,000 to the Brookings Institution for this research.

- The American Council on Education (ACE), a principal spokesman for higher education in Washington, D.C., has established an Economics and Finance Unit to assemble basic data about the financial condition of American institutions of higher education. The unit is an outgrowth of ACE's Policy Analysis Service, which has received Sloan support and which is primarily concerned with immediate policy issues involving higher education.

The Economics and Finance Unit is or will be working on such matters as (1) improving measurements of the financial condition of institutions of higher education; (2) issuance of a quarterly report on economic and financial trends which affect higher education; (3) trends of federal, state, and private financial support for higher education; (4) higher-education capital requirements over the next decade, and (5) an analysis of the sources and uses of student aid funded and controlled by institutions themselves.

For partial support of the Economics and Finance Unit for three years, the Foundation granted \$150,000 to the American Council on Education.

Microeconomics Research and Training

The Foundation began in 1974 an effort to stimulate accelerated research and graduate-level training in the field of microeconomics. It appeared then—

and still does—that the use of new analytic tools could bring about important new insights into the workings of individual markets, and could lead to more effective decision making by entrepreneurs, investors, and public officials. It is also important that future teachers of economics be made aware of the intellectual challenges and the practical benefits to be found in microeconomics analysis.

Since 1974 eight leading economics departments have received Sloan support for workshops in which faculty and graduate students are examining a wide variety of topics in microeconomics. Two more such grants were made in 1977.

- A group of faculty members and graduate students in New York University's Department of Economics will be applying a new theory of the determination of market structure which attempts to explain why a particular industry is naturally monopolistic, oligopolistic, or competitive. Regulation by government will be studied for its influence in moving some industries toward

Professor Dietrich Fischer leads a session of a workshop on regulatory policy and optimal market structure in New York University's Department of Economics. Sloan grants are helping to support microeconomics workshops at ten institutions.



their "natural" (cost-minimizing) structures, and others away from them. The impact of regulation on vertical integration of industry, on the variety of product and service quality offered, and on administrative costs are among the subjects to be studied. The findings are expected to have important policy implications as the debate over regulation and deregulation of certain industries continues.

This microeconomics workshop will be directed by Dr. William J. Baumol of New York University's Center for Applied Economics and will draw on outside economists and scholars from the NYU Law School. The Foundation made a three-year grant of \$210,000 for support of this research and teaching.

- The behavior of participants in the nation's financial markets and of the markets themselves will be the focus of a new workshop in Harvard University's Department of Economics. The effectiveness of the markets in meeting capital needs and the desirability of more or less regulation of them is widely discussed; a group of Harvard economists believes that more must be learned about the responses of the various "actors" in the markets—including households, corporations, and financial intermediaries—to changing market conditions and to changes in their prospective incomes and in the returns and risks of investment in physical assets. The actors' long-range goals and planning, their need to correct for errors of prediction (and the cost of doing so), and their efforts to adapt to constantly changing conditions all need to be taken into account.

The Harvard project will involve weekly research seminars and supervision of doctoral students' dissertations by Professors James S. Duesenberry, Benjamin M. Friedman, John Lintner, and others. The Foundation is supporting this activity through a grant of \$210,000, payable over three years.

Economics for Minorities

- Since 1974 the American Economic Association (AEA) has conducted a summer program for minority students intended to help overcome the serious underrepresentation of minorities in the economics profession. Each summer some 30 minority undergraduates who show aptitude in economics and quantitative skills are given an intensive eight-week course in macroeconomics, microeconomics, and quantitative methods intended to prepare them for graduate study and careers as economists. The students also receive individual instruction on expressing technical ideas in writing, help from teaching assistants on course assignments, and individual counseling on graduate education and career options. Scores on standardized tests have shown a steady increase from one class to the next, after their intensive summer work, and the number planning to pursue the Ph.D. has likewise grown, to 20 of the 35 participants in 1976. (By contrast, in 1973 only about a dozen doctoral

degrees in economics were awarded to minority persons—blacks, Hispanics, and native American Indians.)

The AEA program, directed since its inception by Professor Marcus Alexis, moved after its first summer from the University of California at Berkeley to Northwestern University, where Dr. Alexis is now chairman of the Department of Economics. After making small supporting grants for three years, the Foundation in 1977 approved a grant of \$170,000, to be matched dollar for dollar from other sources, for the 1977, 1978, and 1979 summer programs.

- A summer program at Yale University shares the goals of the American Economic Association program at Northwestern and enrolls some "graduates" of it. The Yale program in 1977 brought nine minority economics students to the New Haven campus for ten weeks of study in the Yale Summer Term. Five of them had attended the AEA program the previous summer. Like the AEA program, the Yale program covers students' tuition and other costs, and provides a small stipend in lieu of foregone summer earnings. The Foundation granted \$20,000 for the 1977 Yale summer program.

Special Management Programs

Grants for management education *per se* during 1977 were concentrated in two specific areas. One grant was intended to help meet the growing organizational demand for competent women managers; the other was to help strengthen the top management of the City of New York.

- Simmons College in 1974 launched the first program of graduate management training for women in the United States; its alumnae are moving into responsible positions at salaries comparable to those of other Masters of Business Administration from well-known management schools. The curriculum is a rigorous one, requiring 45 credits and an internship, and relying heavily on a group of cases specially developed to emphasize the experience of women in managerial roles. Most women in the program have had substantial work experience and many attend part time.

Simmons, a 75-year-old Boston institution for women, proposes to make some of the benefits of its Graduate Program in Management available to women from outside the Boston area who could not leave their jobs long enough for the extended MBA program and who could not attend it part time. An intensive, ten-week Middle Management Program was designed to help such women upgrade their skills in finance, accounting and control, operations management, marketing, economic analysis for managers, quantitative analysis, and information systems. The Simmons program also deals specifically with problems which women managers will confront simply because they are women.

The Middle Management Program began in April of 1977 with prominent firms and some nonprofit agencies sponsoring women employees whom they



Simmons College's Middle Management Program provides an opportunity for women managers to improve their skills through intensive, ten-week sessions. The program is supported by employers; a Sloan grant is supporting new faculty positions for one year.

had identified as having the potential to move on to higher positions. Fees and expenses and participants' salaries are paid by the sponsors. The Sloan Foundation made a grant of \$114,000, principally to support four new faculty members for one year, after which Simmons expects sponsors' payments to support the Middle Management Program.

- New York City and the City University of New York established in 1974 the Urban Academy, to attempt to compensate for the City's growing loss of experienced managers through retirement and to remedy the lack of efficient management systems which threatened to cripple the City. The Academy's mission is "to provide City employees at all levels with job-related training and . . . technical assistance in developing their skills." The Academy has developed on-the-job training programs at virtually all levels of City government, from the clerical to the executive, and has designed special programs for many City departments and agencies.

One of the Academy's programs, the Top 40 Program, seeks to develop a cadre of skilled managers committed to careers in City service. Each year, beginning in January, 1978, forty participants are selected from City agencies on the basis of demonstrated managerial talent, a commitment to City service, and

the likelihood that they will play key roles in their agencies' management over the next two to ten years. They attend classes one day a week and several concentrated week-long sessions; they receive training assignments that are useful to City agencies. Their instruction is principally in information and analysis, management strategies, City procedures and policies, and the ethics and responsibilities of public managers. The Academy's core faculty for this program receives direct and indirect assistance from management schools of national reputation.

The Foundation agreed to provide \$75,000 of the Top 40 Program's first-year budget of \$285,000, through a grant to the CUNY Urban Academy for Management, Inc., which is the Academy's present full name.

Continuing Projects

Programs to teach law to economists and economics to journalists continued in operation with Sloan support in 1977; and earlier seed grants led to further investments in the training of economists for the financial community and in a new effort to explain aspects of economics to the public through the medium of television.

- A second successful Law Institute for Economists was conducted in the summer of 1977 by the Law and Economics Center of the University of Miami School of Law. Led by law professors from Cornell University, the University of Chicago, and Yale University, the Institute introduced 25 economists from 24 universities to the institutional forms of the American legal system, various types of legal analysis, and a comparison of the common law, statutory interpretation, constitutional development, and administrative law.

The interactions of economics and the law constitute a growing field of scholarship and may in time form a subdiscipline of the two major disciplines. The Law and Economics Center has sought to accelerate this movement, largely through intensive courses in economics for lawyers and judges. The first Law Institute for Economists, in 1976, demonstrated that economists too are interested in crossing the disciplinary boundary, and this finding was reaffirmed by the response to the second Institute, for which nearly 200 applied. The Foundation, which supported the 1976 Institute on an experimental basis, made a grant of \$255,000 to the University of Miami in 1977 for support of the next three.

- News of business and economic trends appears to be watched more closely than ever in the present uncertain state of the economy, and there continues to be a growing need for news writers capable of understanding and interpreting the masses of economic data generated by government and other agencies. Princeton University, in an effort to meet some of this need, enrolled in 1977 its third class of eight Alfred P. Sloan Foundation Fellows in Economics Journalism.

The Fellows are working journalists, at a relatively early stage of their careers, who are nominated and partially supported by their newspapers or other media for an academic year in Princeton's Woodrow Wilson School of Public and International Affairs. There they engage in graduate-level study of macro- and microeconomics, quantitative analysis, and related economics and public-policy courses. A special workshop and visiting experts help to extend their experience of academia beyond formal course work.

The Foundation granted \$190,000 to Princeton in 1977 for the economics journalism program's third year, bringing total grants for this purpose to \$785,000.

- Fordham University, situated near the hub of the nation's financial activities in New York City, has discovered an active market for graduate students trained in financial economics. Assisted by a 1975 Sloan planning grant, Fordham in 1976 introduced a Master of Arts program with a specialization in financial economics. Eleven of its 24 new M.A. candidates in economics chose this new specialty, and by the fall of 1977, seventeen were studying financial economics. The first graduates received attractive offers from banks, brokerage firms, insurance companies, and public utilities.

The financial economics program adds to the traditional core of economic theory and quantitative methods courses in financial markets, financial institutions, monetary policy, and financial structure and regulation. Students are trained for such functions as analyzing the performance of the financial sector of the economy and evaluating the effects of regulatory changes on the behavior of institutions and markets. Graduates so equipped are able to bypass much on-the-job training and thus are of increased value to employers, Fordham finds. The program is perhaps unique in that it is designed to prepare graduate economics students for non-academic careers.

To assist Fordham's Department of Economics in expanding the financial economics program and in disseminating information about it, the Foundation made a three-year grant of \$47,500, payable in 1978.

- Two small Sloan grants, one in 1976, aided in the development of a prospectus for a proposed public television series called "The American Gift" and its evaluation by a panel of distinguished economists. The series, to be written and narrated by Martin Mayer, will deal with the remarkable capacity of the American economy to develop technological innovations and carry them through to mass production and mass marketing. Station KERA in Dallas has agreed to undertake production of the series and is seeking to raise the necessary funds from corporations and foundations. The Sloan Foundation made a conditional grant of \$100,000 to the Public Communication Foundation for North Texas, operator of KERA, to be paid when at least \$2,000,000 in other

funds has been raised. (A 1977 grant of \$4,000 to the same organization supported the work of the evaluation panel.)

Other grants in 1977 for economics and management:

Committee for Economic Development, New York, N.Y.	\$7,500
For research by Alfred C. Neal on conflicts between executives and economists about the basis for economic policies.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$12,500
For research on the history of American economic policy by Professor William Letwin.	
New York University, New York, N.Y.	\$20,000
For course development work in economics for master's degree students.	
Pennsylvania Association of Colleges and Universities, Harrisburg, Pa.	\$12,000
For a project to develop a system of financial analysis for private institutions, and to conduct a program of training in its use for college administrators.	
Stanford University, Stanford, Cal.	\$19,200
For a study of Stanford Master of Business Administration graduates holding undergraduate engineering degrees.	
Teachers Insurance and Annuity Association of America, New York, N.Y.	\$15,000
For a study of the implications for higher education of revised mandatory retirement legislation.	
University of Warwick, Coventry, Warwickshire, England	\$5,000
For support of American participants in summer workshops of the University's economics department.	

Science and Technology

On November 22, 1977, a prominent citizen of the United States expressed the following thoughts about the condition of the nation's scientific enterprise:

"The quality of scientific equipment has been falling off rapidly in recent years. The number of top-ranked research centers has been falling in recent years. The percentage of faculty members who are scientists and who are also young has been falling off rapidly in recent years. In 1968, about 45 per cent of the faculty members were young men and women. Now that's dropped off to only about 25 per cent, which shows that in the future we have a problem on our hands unless we take strong action to correct these trends."

The words were spoken by President Jimmy Carter, and the occasion was the presentation of the National Medal of Science to 15 scientists. Mr. Carter stated that he had ordered a "much higher" level of funds for research and development in the federal budget for fiscal 1979, and continued:

"We are not trying to establish nor to maintain a college aid program. I think to the extent that basic research and development commitments can be oriented toward things that improve the quality of our people's lives, enhance the security of our nation, contribute to our position in world leadership, to that extent these allocations of funds and interests will be more readily acceptable and supported by the American people."

The President said he would work for an "enhanced" climate for research and development, and praised the international scientific community for its role in creating "a basis for future peace and understanding and a sharing of a common purpose for mankind."^{*}

President Carter's remarks, in the first paragraph quoted above, closely paralleled the findings of an 18-month survey of American academic science

^{*} Quoted in *Higher Education and National Affairs*, December 2, 1977.

financed by the National Science Foundation and published in June of 1977 with assistance from the Sloan Foundation.^{*} His other, more encouraging words offered hope that his administration is taking to heart the study's central conclusion: the American academic science enterprise, while still strong at the top, is suffering an erosion of its base which threatens a serious slowdown in scientific progress once the momentum of the immediate past is exhausted.

The President's statement and the stronger federal support it presaged appeared to be the best news in some time for university basic research, whose federal support fell by some 9 per cent in constant dollars between 1968 and 1976 while a growing maze of federal regulations left scientists with less time for research. But the authors of the report cited appear to believe that it will take some years to reverse the trends they detected in declining graduate enrollments, deteriorating research equipment, and an insidious tendency among even established researchers to propose only "safe" projects in an atmosphere of funding austerity.

Grants for research and education in science and technology through the Foundation's General Program amounted to \$4.7 million in 1977, the highest in recent years. In addition, the Foundation committed \$776,250 through its new Particular Program in Cognitive Sciences (see Page 48).

Scientific Research

• The Carnegie Institution of Washington is not, in the conventional sense, an academic institution. Since 1902 it has engaged in fundamental research which has led to important discoveries in genetics, pre-Columbian archeology, astronomy, geophysics, plant biology, and embryology. Functioning largely upon its own endowment and largely free of disciplinary barriers, the Institution has enjoyed a near-unique flexibility in taking up multi-faceted scientific problems wherever they are found and pursuing them for as long as they remain challenging to its scientists. Postdoctoral and predoctoral fellows gain valuable experience working with the Institution's research staff; it is thus an educational as well as a research organization.

Times change for the Carnegie Institution as for other institutions, and for some years now it has been financing current operations partly by invading its endowment. Under its new president, James D. Ebert, who will assume office July 1, 1978, it is developing a capability for fund raising, including efforts to augment its endowment and to secure more research support from government. For a three-year transition period it has turned to Sloan and other foundations for interim operating support.

A Sloan grant of \$600,000 over three years was designated for support of the Carnegie Institution's Department of Terrestrial Magnetism, which now

^{*} *The State of Academic Science: The Universities in the Nation's Research Effort*, by Bruce L. R. Smith and Joseph J. Karlesky. Change Magazine Press, New Rochelle, N.Y.

deals with the planetary and earth sciences. The constant flow of new information about the moon, the sun, the crust and upper mantle of the earth, and the other planets has created new opportunities for understanding the formation and evolution of these constituents of our solar system. The Department's 14 scientists, headed by Dr. George W. Wetherill, and their research fellows will bring to bear on these studies their knowledge of numerous branches of physics, chemistry, and astronomy.

- In the field of photochemistry, the study of the effects of light on chemical reactions, the University of California at Santa Cruz (UCSC) has an opportunity to develop a center of excellence in research and graduate training. A core group of five photochemists, including Dr. George S. Hammond, share a number of complementary research interests ranging from the chemical processes resulting from stimulation of the eye to theoretical studies of the effects of light on large molecules. UCSC, only ten years old, is seeking to establish strong graduate programs in certain areas of the natural sciences, and photochemistry is one area where the needed "critical mass" exists.

The UCSC photochemistry group proposes to develop a basic two-quarter course covering the basic concepts and experimental techniques of the discipline. Established courses in spectroscopy and energy transfer will complement the basic course, and special courses on lasers, solar energy, photobiology, and other topics will be presented by the core group and visiting faculty. Seminars and guest lectures will round out the program. For partial support of course development, graduate research, and program evaluation by outside consultants, the Foundation made a grant to the University of California at Santa Cruz of \$90,000, payable over three years. (A 1976 Sloan grant of \$20,000 helped lay the groundwork for the photochemistry program at Santa Cruz.)

- Since 1974 the Southern Regional Education Board (SREB) has operated a small-grants program which enables scientists and Ph.D. candidates in 14 Southern states to make use of unusual and expensive equipment not available on their own campuses. In its first three years the program helped more than 300 scientists to visit for brief periods at other institutions having equipment such as a Van de Graff Tandem accelerator or an electron microscope, or specialized laboratories for nutrition, ecology, or paleomagnetism. SREB has published a *Catalog of Uncommon Facilities in Southern Universities*, and invites proposals from faculty members and doctoral students wishing to use these and other facilities. Most grants are from \$150 to \$500.

The Sloan Foundation extended initial support of \$110,000 for the small-grants program in 1974. At that time SREB hoped that by 1977 the legislatures of the 14 states involved would see the value of the program and would decide to help finance it. That has not yet occurred, but it remains in prospect. The Foundation in mid-1977 agreed to make a grant of \$72,300 to sustain the program for one additional year.



Two biochemists from the University of South Carolina were able to travel to the University of North Carolina to use specialized equipment through support from the small-grants program of Southern Regional Education Board. Drs. Roland Girling (left) and Elmer Amma study a three-dimensional representation of a hemoglobin complex.

- "Transplanted" mathematicians have received Sloan support to apply their skills to problems of environmental carcinogens and environmental health, through a program conducted by the Institute for Mathematics and Society of the Society for Industrial and Applied Mathematics (SIAM). The SIAM Institute hopes that mathematicians who are thus "transplanted" will develop new professional specialties in applied fields, and believes that in order for them to do so they should work for a period (usually two years) as full-time members of interdisciplinary groups of scholars.

A mathematical theory of cultural evolution seems a real possibility in the light of the mathematical work on biological evolution that has gone before. The transmission of culture, however, seems to resemble the transmission of epidemics more than it does that of genetic inheritance. Hence the existing mathematical theories of epidemics may help to build a bridge between theories of genetic evolution and the desired theory of cultural evolution. A young mathematician from the University of New Orleans (formerly Louisiana State University at New Orleans) has been transplanted to Stanford University, where he is working with two distinguished scholars in population genetics to develop the proposed mathematical theory of cultural evolution. Primarily for

support of the mathematician, Dr. Kuang-Ho Chen, the Foundation made a two-year grant of \$66,000 to the SIAM Institute for Mathematics and Society.

• The Foundation in 1977 awarded Sloan Fellowships for Basic Research totaling \$1,562,293 to 95 young scientists in 53 colleges, universities, and research institutions in the United States and Canada. The scientists, who are designated Sloan Research Fellows, are generally at the beginning of their academic careers and are selected on the basis of their outstanding potential for contributing to fundamental knowledge in physics, chemistry, mathematics, and neuroscience. Their average age is 30.

As noted earlier, federal funds for basic research have become much more difficult to obtain in recent years. Not only has the aggregate of such funds declined in real dollars, but also the competition for such support has become more intense and the amount of time spent seeking funds and complying with bureaucratic requirements has multiplied. Moreover, the form of federal research support has altered significantly. A decade ago, says the report on academic science cited above, nearly half of such money received by universities was in the form of flexible institutional support; in 1976, only about 20 per cent was. The bulk of university research support now is in the form of direct project and contract grants, many of them for "targeted" studies. There is a growing scarcity of discretionary money to explore new research ideas or to change the direction of an investigation.

For Sloan Research Fellows, use of funds from the Foundation is almost entirely discretionary. No project proposal is expected or desired, nor is strict adherence to any particular line of research. The annual reporting requirement is minimal. The purpose of the fellowships is to confer on the most brilliant young researchers who can be found a measure of flexibility and freedom to follow their own bent as to where the most interesting scientific challenges may be.

The fellowships are for two years and their average amount is about \$8,200 a year. In 1977 there were 26 new Fellows in physics, 32 in chemistry, 17 in mathematics, and 20 in neuroscience. Besides these 95, an additional 91 Fellows were receiving support through earlier awards. Since the program began in 1955, fellowships aggregating \$28,070,600 have been awarded to 1,406 scientists at 151 institutions.

The fellowship funds may be used for support of technical assistance, computer time, summer support, professional travel, support of predoctoral and postdoctoral fellows, equipment and supplies, release from teaching where this does not conflict with the needs of the Fellow's department, and any other purposes approved by the Fellow's institution.

Nominations for Sloan Fellowships are made by senior scientists familiar with the potential of younger colleagues, and are reviewed by a Foundation

committee of distinguished scientists, two from each of the four fields. The committee's membership in 1977 consisted of:

- | | |
|---|---|
| Dr. T. D. Lee, Professor of Physics,
Columbia University, Chairman. | Dr. I. M. Singer, Professor of Mathematics,
Massachusetts Institute of Technology. |
| Dr. William M. Fairbank,
Professor of Physics,
Stanford University. | Dr. Eliot Stellar, Provost,
University of Pennsylvania,
a neuroscientist. |
| Dr. Jurgen Moser,
Professor of Mathematics,
New York University. | Dr. Gilbert Stork, Professor of Chemistry,
Columbia University. |
| Dr. Francis O. Schmitt,
Neurosciences Research Program. | Dr. John S. Waugh, Professor of Chemistry,
Massachusetts Institute of Technology. |

Scientists who received Sloan Fellowships in 1977 are the following, listed by their institutions and fields of study:

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| Boston College
Chemistry: David L. McFadden | University of Chicago
Chemistry: David W. Oxtoby
Mathematics: William E. Beckner
Physics: Gene F. Mazenko |
| Brown University
Chemistry: Kathlyn A. Parker
Physics: Donald W. Forsyth
Neuroscience: Robert L. Patrick | City of Hope National Medical Center
Neuroscience: Steven D. Flanagan |
| California Institute of Technology
Chemistry: Peter B. Dervan
Physics: Steven E. Koonin,
H. David Politzer, Darryl L. Smith | University of Colorado
Chemistry: Stephen R. Leone |
| University of California, Berkeley
Mathematics: Marina Ratner | Columbia University
Mathematics: Henry C. Pinkham
Neuroscience: Ann-Judith Silverman
Physics: Pierre V. Sokolsky |
| University of California, Davis
Physics: John F. Gunion | Cornell University
Chemistry: John R. Wiesenfeld
Mathematics: Stephen S. Gelbart |
| University of California, Lick Observatory
Physics: Sandra M. Faber | Eastern Washington State College
Physics: Daniel R. Long |
| University of California, Los Angeles
Chemistry: Charles E. Strouse
Mathematics: Andrew J. Majda
Physics: Paul M. Chaikin, Michael Jura,
Jonathan I. Katz, Susan W. Kieffer | Georgia Institute of Technology
Chemistry: Sheldon W. May |
| University of California, San Francisco,
School of Medicine
Neuroscience: Juan I. Korenbrot | Harvard Medical School
Neuroscience: Jonathan B. Cohen,
Lily Kung-Chung Jan,
Richard A. Murphy |

Harvard University
Chemistry: Stephen C. Harrison
Physics: Alvaro De Rujula,
Allen L. Sessoms

University of Houston
Chemistry: Harold L. Kohn

Illinois Institute of Technology
Chemistry: Joel M. Bowman

University of Illinois, Urbana-Champaign
Chemistry: Kenneth J. Kaufmann,
Gary B. Schuster

Indiana University
Mathematics: Grahame Bennett

Iowa State University
Chemistry: Richard C. Larock,
Walter S. Struve

Johns Hopkins University
Mathematics: W. Stephen Wilson
Neuroscience: Richard K. Hunt

University of Kentucky
Neuroscience: David J. Prior

Louisiana State University
Physics: A. R. P. Rau

University of Maryland
Chemistry: Raymond J. Bergeron

University of Maryland School of Medicine
Neuroscience: Mary Lou Oster-Granite

Massachusetts Institute of Technology
Mathematics: Dorian Goldfeld
Physics: Sean C. Solomon
Neuroscience: Stanley J. Schein

University of Massachusetts
Mathematics: Richard S. Ellis

University of Minnesota
Chemistry: David A. Dixon

New York University
Chemistry: Henry C. Brenner
Neuroscience: J. Anthony Movshon

**City University of New York,
Mount Sinai School of Medicine**
Neuroscience: Betty Zimmerberg

State University of New York, Buffalo
Chemistry: Paras N. Prasad

State University of New York, Stony Brook
Mathematics: Joel H. Spencer

Northwestern University
Mathematics: Judith D. Sally
Physics: William P. Halperin

University of Notre Dame
Chemistry: Xavier Creary

Oregon State University
Physics: Kenneth S. Krane

University of Oregon
Chemistry: Thomas R. Dyke

Princeton University
Chemistry: Jack R. Norton
Mathematics: Shiu-Yuen Cheng
Physics: J. Richard Gott, III,
Claudio Teitelboim

Purdue University
Chemistry: Philip L. Fuchs

Rice University
Mathematics: Peter B. Shalen

University of Rochester
Chemistry: Mark G. Sceats

Salk Institute
Neuroscience: Jon M. Lindstrom,
John P. Merlie, Helen J. Neville,
William B. Stallcup

University of South Carolina
Chemistry: Thomas A. Bryson,
Paul D. Ellis

University of Southern California
Chemistry: Thomas C. Flood
Physics: Anupam Madhukar

Stanford University
Chemistry: Michael D. Fayer,
Wray H. Huestis
Mathematics: Misha Zafran
Neuroscience: Jeffrey J. Wine

University of Texas, Austin
Physics: John M. Scalapino

**University of Texas
Health Science Center at Dallas**
Neuroscience: Jorge Farber

University of Toronto
Chemistry: Paul W. Brumer,
Geraldine A. Kenney-Wallace
Physics: William R. Peltier

University of Utah
Mathematics: James A. Carlson

**Virginia Polytechnic Institute and
State University**
Physics: James J. Condon

University of Virginia School of Medicine
Neuroscience: S. Murray Sherman

University of Washington
Mathematics: Douglas C. Ravenel
Physics: Thompson H. Burnett

Yale University
Chemistry: Kenneth D. Jordan
Mathematics: John J. Millson

● Since 1945 the Sloan-Kettering Institute for Cancer Research has worked "toward the conquest of cancer" through a variety of increasingly specialized and sophisticated scientific techniques. Much of its work now is basic research at the frontiers of modern biology, and through its associated training programs part of a new generation of cancer researchers is being developed. The Institute's close relationship with Memorial Hospital for Cancer and Allied Diseases, through Memorial Sloan-Kettering Cancer Center, insures that laboratory discoveries will be translated without delay into improved patient care.

The Sloan-Kettering Institute's operating budget has grown to more than \$24 million a year, of which about 85 per cent is provided by the National Cancer Institute and other government agencies. Its leaders consider it vital to maintain also a solid base of private support, and they expend considerable effort toward this end. The Sloan Foundation's annual contribution to the Institute in 1977, including \$400,000 from a prior commitment, came to \$600,000, which represented about 18 per cent of the Institute's income from private sources.

Science and Engineering Education

● Massachusetts Institute of Technology has been for a century or more one of the world's most eminent institutions for training and research in the sciences and engineering. More recently it has achieved eminence also in economics, political science, and management education; but in the humanities and some of the social sciences M.I.T. does not rank equally high. This situation has been a cause of concern to M.I.T.'s leadership for some time. That concern was heightened recently when a study found that many of the students whom M.I.T. most desired to attract were going instead to universities where the intellectual horizons were broader.

A new M.I.T. effort to deal with this institutional problem will involve the creation of a new kind of entity to be called the College of Science, Technology, and Society. The College will have its own faculty, at least in part, who will be of a stature comparable to that of the faculties of the Institute's famous schools, M.I.T. hopes. It will have its own undergraduate curricular offerings, and it will engage in research. For the present it will not offer its own degree; the education it provides will be designed as a component of science or engineering education. The College's closest academic links will be with the School of Humanities and Social Science; its first director will be the associate dean of that School, the political scientist Donald L. M. Blackmer.

By this means M.I.T. hopes to create a community of scholars from varying disciplines, all concerned with the place of science and technology in society, who will attract other scholars and students of an academic caliber commensurate with M.I.T.'s over-all reputation for excellence.

The undertaking will be an expensive one, and the Institute is making major commitments of its own funds for the costs of staffing and housing the new College. It calculates that it will need \$3.1 million in outside funds to move forward with the venture over the next four years. Included in this sum is the cost of adding new senior and junior faculty and other personnel, a post-doctoral program in the College, and faculty interns who will be invited from other institutions.

The Sloan Foundation in 1977 made a grant of \$1,000,000, payable over four years, to M.I.T. for development of the new College. For the same purpose the Andrew W. Mellon Foundation made a commitment of \$1,000,000, and the William and Flora Hewlett Foundation committed \$500,000.

- The natural sciences have always had difficulty attracting minority students, because such students often are unaware of career opportunities in science and are not prepared to enter college-level science studies. Few faculties have the time and the resources to deal with the problems of remediation and motivation presented by such students. At Oakes College of the University of California at Santa Cruz the situation is different. Oakes, one of eight small liberal-arts colleges on the Santa Cruz campus, is multiracial in both its faculty and its student body. Faculty members are mostly young and are deeply committed to making scientific careers accessible to the College's "non-traditional" students. Oakes also has the advantage of its own new science center, centrally situated and available around the clock for student laboratory projects.

The Oakes science program guides lower-division students through three stages of preparation for the University's regular science courses. "Selected Topics in Modern Science" is a team-taught, multi-disciplinary course designed to stimulate interest in science and take some of the mystery out of it through



A special program at Oakes College of the University of California at Santa Cruz is designed to make careers in science more accessible to the College's multi-racial student body. Dr. Narinder S. Kapany (standing), coordinator of the program, supervises a computer exercise by a biology student in the College's new science center.

immediate immersion in laboratory projects with a built-in high success rate. "Introductory Courses" on a variety of timely topics such as "How Things Work: The Environment" and "Nutrition and the Poor" bring in the amounts of chemistry and biology needed to understand those subjects. For students who decide to study for a major in the University's regular science courses, the "Introductory Science Sequence" offers a series of transitional courses in chemistry and mathematics designed to overcome any remaining handicaps. The University assumes that many of these students will go on to graduate school and will themselves become faculty members at colleges and universities.

The innovative Oakes science program needed some additional faculty

and support for student tutors and laboratory aides, among other things, to bring it to full strength. The Foundation made a two-year grant of \$245,000 to the University of California at Santa Cruz for these purposes.

- The use of computers in the classroom is reaching higher and higher levels of development through the work of a large team of scientists, engineers, and mathematicians at California Institute of Technology. A list of the group's achievements over the last three years would include many new computer programs for interactive use in live classroom situations; techniques for adapting to undergraduate courses computer techniques originally created for faculty research and advanced graduate students; a new method of conveying visual concepts by converting three-dimensional visual information into a formulation that can be stored in a large computer memory; and the initiation of a project on using minicomputers, and coupling them, in ways that yield much more computing power at much less cost than can be done with large machines.

Several of these projects are now part of Caltech's regular instructional activity; on others, such as the minicomputer project, more work remains to be done. Caltech also plans to develop a means of disseminating to other institutions those programs and techniques which are ready for adoption elsewhere.

The first three years of this project were assisted by a 1974 grant of \$400,000, made through the Foundation's Particular Program on Technology in Education. That program has expired, so a renewal grant of \$200,000 for three years was made to Caltech in 1977 through the General Program.

- Among museums which attempt to explain scientific concepts to laymen in stimulating and accurate ways, the San Francisco Exploratorium stands pre-eminent in this country. Its 400 exhibits, keyed to the processes of perception, enable the viewer to participate directly in demonstrations of scientific principles, and have proven a delight to everyone from school children to professional scientists. The Exploratorium is host to half a million visitors annually, including 50,000 students on field trips last year, and also including directors of other museums who come to study the techniques developed by its director, Dr. Frank Oppenheimer. Some of its interactive exhibits have been replicated at other museums.

Despite the excellence of its exhibits, the Exploratorium since its founding in 1969 has lacked sustained long-term funding and has had to rely on project grants and gifts. (Sloan was the first major foundation to contribute.) For its next major undertaking the Exploratorium has selected the subject of heat and temperature. A set of interactive exhibits and extensive written and graphic materials are being developed, explaining in logical order the history and development of the concepts through which man has come to understand and measure the phenomena of heat and temperature. The Palace of Arts and Science Foundation, which operates the Exploratorium, received a 1977 Sloan

grant for this purpose of \$90,000, which matched part of a larger grant from the National Endowment for the Humanities.

- Columbia University resolved in 1977 to establish a distinguished visiting professorship in science and human affairs, to be named for I. I. Rabi, the Columbia physicist and Nobel laureate who has long been one of the foremost spokesmen for science in national and international forums. The occasion for this decision and its announcement was the 50th anniversary in November of Columbia's Pupin Physics Laboratories, in which Professor Rabi has been a leading stimulus since their inception.

Columbia's intention is to raise an endowment for the new chair in science and human affairs, to bring to it scientists of the highest eminence in their own fields and beyond those fields, and to make their wisdom and expertise available to schools and departments throughout the University. Columbia expects to create a program of postdoctoral fellowships, distinguished visiting lecturers, and symposia and conferences around the presence of the scientific statesmen who will occupy the Rabi chair. The Sloan Foundation made a grant of \$150,000 for support of the visiting professors for the first three years.

Other grants in 1977 for research and education in science and technology:

American Academy of Arts and Sciences, Boston, Mass.	\$20,000
For partial support of a special issue of <i>Daedalus</i> on the subject of radical technologies.	
Bowdoin College, Brunswick, Me.	\$20,000
In support of a review of Bowdoin's science programs.	
University of California, Los Angeles	\$16,000
For supplemental support of a research group in quantum mechanics under Professor Julian Schwinger.	
Community Television of Southern California (KCET), Los Angeles, Cal.	\$20,000
In partial support of the research and development phase of a public television series on astronomy, <i>Man and the Cosmos</i> , to be produced and narrated by Dr. Carl Sagan.	
Corporation for Public Broadcasting, Washington, D.C.	\$20,000
In partial support of production of a pilot program for <i>Media Probes</i> , a proposed series for public television about the social consequences of technological developments in communication.	
Educational Change, Inc., New Rochelle, N.Y.	\$18,000
In support of the final preparation, production, and dissemination by Change Magazine Press of <i>The State of Academic Science</i> , by Bruce L. R. Smith and Joseph J. Karlesky.	
Franklin and Marshall College, Lancaster, Pa.	\$10,500
For partial support of a month-long faculty seminar on the history and philosophy of science.	
University of Georgia, Athens, Ga.	\$20,000
For supplemental and terminal support of a project in studies of stochastic systems at the University's Center for Applied Mathematics.	
Gustavus Adolphus College, St. Peter, Minn.	\$20,000
For support of the 1977 Nobel Conference on "The Nature of Life."	

Harvard University, Cambridge, Mass.	\$5,000
For supplemental support of research and lecture activities of Dr. George B. Kistiakowsky in science and public affairs.	
Marine Biological Laboratory, Woods Hole, Mass.	\$19,000
For supplemental and terminal support of the Laboratory's summer neurobiology course.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$20,000
In support of the preparation of a biography of the black biologist Ernest Everett Just by Professor Kenneth Manning.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$4,300
In support of the Engineering Foundation Conference on "Cybernetic Models of the Human Neuromuscular System."	
Massachusetts Institute of Technology, Cambridge, Mass.	\$10,000
For completion of Workshop on Alternative Energy Strategies project and distribution of its report, <i>Energy: Global Prospects 1985-2000</i> .	
Mathematical Association of America, Washington, D.C.	\$14,300
In support of a conference to assess the current state of collegiate mathematics and to establish priorities for national efforts in the coming decade to stimulate changes in the content and teaching of collegiate mathematics.	
University of Minnesota, Minneapolis, Minn.	\$6,500
In support of a symposium on the history of nuclear physics.	
Montana State University, Bozeman, Mont.	\$20,000
In partial support of a new program of cooperative education for industrial engineering students.	
National Academy of Sciences, Washington, D.C.	\$20,000
In partial support of the planning phase of a project to develop a system for the assessment of research Ph.D. degree programs in American universities.	
State University of New York, Stony Brook	\$13,750
For renewed and terminal support of development of a curriculum in societal mathematics. (Paid to Stony Brook Foundation, Inc.)	
University of Oxford, Oxford, England	\$11,000
For partial support of an international conference on inductive logic, to be held in 1978.	
Rockefeller University, New York, N.Y.	\$5,000
In support of a feasibility study for a proposed Council for Science and Technology in Development.	
Salk Institute, San Diego, Cal.	\$20,000
For transitional support of the Institute's Center for Behavioral Neurobiology.	
Wesleyan University, Middletown, Conn.	\$20,000
In support of a teaching apprenticeship program at Wesleyan's Math Clinic.	

Sloan Commission on Government and Higher Education

The Sloan Commission on Government and Higher Education, discussed in the President's Statement of this Report, consists of the following members:

LOUIS W. CABOT

Chairman of the Cabot Corporation, member of the Massachusetts Institute of Technology Corporation, and former Harvard Overseer, *Chairman*.

CARL KAYSEN

David W. Skinner Professor of Political Economy at Massachusetts Institute of Technology, and former Director of the Institute for Advanced Study at Princeton, *Vice Chairman and Director of Research*.

JEAN ALLARD

Attorney, Chicago, Illinois.

PROFESSOR JOHN D. BALDESCHWIELER

Chairman of the division of chemistry and chemical engineering of the California Institute of Technology, and former deputy director of the Office of Science and Technology in Washington, D.C.

DR. ALBERT BOWKER

Chancellor of the University of California, Berkeley.

WILLIAM BRADLEY

New York Knickerbockers.

EDWARD W. CARTER

Chief executive officer of the Broadway Hale Stores, Los Angeles.

DR. PETER D. CLARK

Chairman of the board of the *Detroit News*.

RALPH A. DUNGAN

U.S. executive director, Inter-American Development Bank, and former chancellor of the Higher Education System of the State of New Jersey.

MURRAY FINLEY

President of Amalgamated Clothing Workers.

DR. NORMAN FRANCIS

President of Xavier University in New Orleans.

DR. WILLIAM FRIDAY

President of the University of North Carolina.

THOMAS GATES

Consultant, Morgan Guaranty Trust Company, and former Chief of U.S. Liaison Office in Peking.

DR. ROBERT GLASER

President of the Kaiser Family Foundation and former dean of the Stanford University Medical School.

THE HONORABLE A. LEON HIGGINBOTHAM, JR.

U.S. District Court Judge for the Eastern District of Pennsylvania.

CARLA A. HILLS

Washington attorney and former Secretary of the Department of Housing and Urban Development.

DR. JAMES R. KILLIAN, JR.

President emeritus of Massachusetts Institute of Technology and honorary chairman of the M.I.T. Corporation.

J. IRWIN MILLER

Former chief executive officer of the Cummins Engine Company.

SAMUEL PROCTOR

Professor of education, Rutgers University.

WILLIAM ROTH

Businessman, San Francisco.

PROFESSOR HARRIET SHERIDAN

Professor of English and dean of Carleton College, Northfield, Minnesota.

DR. ROBERT L. SPROULL

President of the University of Rochester.

THOMAS J. WATSON, JR.

Former chief executive officer of IBM.

DANIEL YANKELOVICH

Specialist in market research and consultant on public opinion with the firm of Yankelovich, Skelly and White.

The Foundation has allocated \$2.5 million for the operations of the Sloan Commission on Government and Higher Education over two years. During 1977, appropriations totaling \$1,550,000 were approved for this purpose by the Foundation's Trustees. The Commission's offices are at 330 Broadway, Cambridge, Mass. 02139.

Other General Program Grants

While the Foundation concentrates the bulk of its efforts and expenditures in the broad General Program fields discussed in the preceding pages, and in the Particular Program areas which follow, it also pursues from time to time certain secondary interests. Some of these may evolve into major program interests; most will not. All are deemed worthy of something more than passing attention.

In the year under review the Foundation contributed with others to interdisciplinary studies which may lead to a better understanding of philanthropy and the nonprofit sector in general; it acted to help meet one pressing need of one of the nation's major research libraries; and it ventured into the controversy surrounding the much-discussed decline in student writing skills.

Studies of the Nonprofit Sector

- Despite the awesome size of the government and business establishments in the United States, it appears that no other country assigns so large a share of its social tasks to a third, "nonprofit" or "independent" sector of society. A group of scholars at Yale University believes it is time for a serious and sustained effort to delineate this third sector through a program of empirical, analytical, and theoretical research.

The Yale study of independent institutions, directed by Professor John Simon of the Yale Law School, is based on two overarching themes: What are nonprofit organizations good for, as compared to government and business entities (the theme of "function")? And, in the absence of ballot and market mechanisms, how is the nonprofit sector to be appraised and regulated (the theme of "accountability")? These questions will give rise to a number of historical, legal, and comparative studies, an effort to prepare a "taxonomy" of the nonprofit world, and other research.

The Sloan Foundation is supporting a part of this work, intended to develop a basic rationale for nonprofit institutions which up to now has been lacking. Scholars in economics, law, psychology, and sociology will endeavor to build a descriptive model of the nonprofit sector, to define and analyze the behavior of nonprofit enterprises as contrasted with that of business enterprises, and to determine how the evolving basic rationale is explained, reinforced, or contradicted by the laws and regulations which apply to nonprofit institutions.

The Foundation in 1977 made a three-year grant of \$300,000 to Yale for support of this research.

- The impact of philanthropic foundations on the formulation of public policy in the United States is the subject of a historical study being undertaken by two senior scholars at the University of Chicago. The changing and sometimes conflicting relationships of foundations and government as both seek to promote beneficial social change will be examined in depth by Dr. Barry D. Karl, chairman of the Department of History, and Dr. Stanley N. Katz of the Law School, who also is director of the University's graduate degree program in public policy.

A number of foundations are helping to support the Chicago study; the Sloan Foundation made a grant for it of \$50,000.

The Library Problem

The plight of the nation's great research libraries, whose resources are lagging farther behind the demand for their services, has been a matter of concern to the Sloan Foundation and other foundations for some years now. Technological efficiencies are being implemented by some libraries, including those in the Research Libraries Group in the Northeast (see the Report for 1974, Page 21) and in the Stanford-Berkeley collaboration in California (Report for 1976, Page 42). Some sort of computerized national network may be the ultimate solution, but in the meantime one emergency task of preservation became imperative.

- The New York Public Library is used by many scholars in preference to university libraries because its Main Public Catalog, consisting of 11 million entries, is more extensive and more richly cross-indexed than the catalogs of most university libraries. But because it is so heavily used, this irreplaceable card catalog is literally falling apart. Many entries going back as far as the middle of the last century are in longhand in pencil or ink, and are now so faded or mutilated as to be nearly unreadable. If this deterioration continues unchecked, there soon will be no way for scholars to find important books in the Library's possession.

The Library has mounted a four-year project costing \$3,175,000 to reconstruct and rehabilitate the catalog, to make a permanent microfilm record of it, and to produce from the microfilm a printed book catalog. The catalog

cards will be retired, and the book catalog can be cheaply reproduced as it wears out in use. It will also be available for purchase by other libraries, thus making possible a search of the holdings at a distance, not now possible with any research library.

A number of foundations and the National Endowment for the Humanities are contributing to the New York Public Library's catalog-reconstruction project. The Sloan Foundation was asked to underwrite the approximate cost of the microfilming operation; a four-year Sloan grant of \$325,000 was approved.

Expository Writing

Much was written in 1977 about "Why Johnny Can't Write," enough perhaps to endow the state of students' writing abilities with the dimensions of a national problem. The Foundation's officers and staff have been made aware for some years of the additional costs and burdens imposed on colleges and universities by the arrival in increasing numbers of students who are poorly prepared to express themselves in clear, logical prose. It became an interesting challenge to try to determine what if anything a foundation could do about the problem.

Advice was sought from all quarters: teachers of English in public and private secondary schools, school administrators, college teachers of English, linguists, cognitive psychologists, university administrators, and textbook publishers. The officers and staff consulted perhaps a hundred such persons in individual visits and in informal gatherings called to discuss the problem. Two exploratory grants were made, one for planning and organizational expenses of a proposed Consortium of Seven Writing Programs at leading universities (\$14,400 to Cornell University) and one for a two-week summer study by writing experts and concerned faculty members at Andover, Mass. (\$45,000 to Phillips Academy, Andover).

In all these investigations the Foundation found broad agreement that a "writing problem," probably of increasing severity, does exist, and that educational reforms and perhaps more basic research in the field of writing skills are needed. There was little agreement, however, on precisely which reforms should be undertaken, and there were few who would volunteer to lead the effort.

At the close of 1977, then, the matter of a Foundation program to upgrade expository writing skills remained very much undecided. The Foundation published in an Occasional Paper* some of the diverse views it had received on the subject, and invited further suggestions.

* *The Teaching of Expository Writing: An Exchange of Views*, James D. Koerner, editor. Contributors include Albert H. Bowker, University of California at Berkeley; Stephen White, Alfred P. Sloan Foundation; Norman Macrae, *The Economist*; Donald L. M. Blackmer, Massachusetts Institute of Technology; Theodore R. Sizer, Phillips Academy, and others.

The Foundation made these other grants through its General Program in 1977:

Association of American Universities	\$15,000
To help implement recommendations of the Committee on the Future of the AAU, involving expansion of the Washington office and improvement of AAU services.	
COPUS Research Project, Washington, D.C.	\$10,000
For partial support of research and dissemination on the subject of student financial aid by the COPUS Research Project, established by the Coalition of Independent College and University Students.	
Council for Financial Aid to Education, New York, N.Y.	\$14,000
For partial support of special meetings and other activities on the occasion of the Council's 25th anniversary year.	
Council on Foundations, New York, N.Y.	\$10,000
For 1977 membership support.	
Council on Library Resources, Washington, D.C.	\$15,000
For partial support of a planning project for the establishment of a national periodicals center.	
Education Development Center, Newton, Mass.	
For partial support of planning and development by EDC of closer working relationships with regional school systems.	\$10,000
For a summer workshop on "Real Problem Solving in Secondary Education."	\$10,000
Institute for Services to Education, Inc., Washington, D.C.	\$7,600
In support of a special advisory committee to review ISE's past, present, and future and to make recommendations to the ISE board of trustees.	
Maine Maritime Academy, Castine, Me.	\$17,500
For partial support of a feasibility study for a Center for Advanced Maritime Studies.	
NAACP Special Contribution Fund, New York, N.Y.	\$20,000
In partial support of the establishment of a direct mail revolving fund.	
New York University, New York, N.Y.	\$20,000
For partial support of a planning project for the establishment of a graduate-level consortium among five New York institutions of higher education.	
Research Foundation of The City University of New York (for Queens College of CUNY)	\$9,700
For a study of the feasibility of a central computer-based editorial facility for scholarly journals and academic publishing in the New York City area.	
Stony Brook Foundation, Stony Brook, N.Y.	\$19,517
For evaluating and reporting on a collaborative study by the Tri-State Regional Planning Commission and the State University of New York at Stony Brook on the impact of energy problems on transportation and employment patterns in the New York metropolitan area.	

Particular Programs



Minority Engineering Education

As the Particular Program in Minority Engineering Education completed its fourth full year, grants for it numbered 60 and totaled \$8.3 million, including seven grants totaling \$1.6 million in 1977. The Foundation expects to continue this program through the close of 1979, although some multi-year grants will run beyond that time.

The proportion of engineering freshmen from the under-represented minorities (blacks, Hispanics, and native American Indians) in the fall of 1977 exceeded 8 per cent for the first time; according to preliminary data from the Engineering Manpower Commission of the Engineers Joint Council, engineering schools enrolled approximately 7,470 minority freshmen, 8.6 per cent of a growing over-all freshman enrollment which reached about 87,300. (In 1972, the base year for the minority engineering effort, there were 52,100 freshmen, including 2,172 minority students—4.2 per cent.)

Because so many more students of all races are electing to pursue careers in engineering, progress toward equal representation for minorities, on a percentage basis, has been slower than was anticipated (although growth in numbers of minority freshmen continues at a much higher percentage rate than for all freshmen). Also, there is some evidence that the simpler part of the minority increase—engineering schools learning to recruit the most obviously qualified—has been largely accomplished, and that further increases will require a different kind of effort. The Foundation's grants during 1977 were concentrated almost entirely on efforts at the pre-college level, in support of programs designed to enable many thousands of minority secondary-school students to qualify for engineering study, should they choose to pursue it.

Other activities vital to the minority engineering effort have received Sloan support, and some will receive more. Several grants have supported extra efforts by universities to retain minority students through their undergraduate

years, and the need for minority engineers with training beyond the baccalaureate is being partially met through the National Consortium for Graduate Degrees for Minorities in Engineering. The National Fund for Minority Engineering Students is expanding its efforts to supply the financial aid which is needed by minority students in particular. In the latter two programs, as in others, business and industry are providing substantial support for the education of the minority engineers whom they hope to employ.

Grant making by the Foundation in this field during 1977 proceeded along two lines: support for new and existing consortia of engineering schools working to expand their minority enrollments, and continuing support for the development of new curricular materials for use in predominantly minority secondary schools.

Regional Engineering Consortia

- The largest of the regional minority-engineering consortia, organized by the Committee on Institutional Cooperation (CIC) in 1975, is the Midwest Program for Minorities in Engineering. Its 17 member institutions (including more than one campus of some university systems) conduct a wide variety of pre-college programs, ranging from single-college programs to collaborative efforts involving four institutions in Chicago and five in Detroit. The consortium is known as CIC+ MPME, the "plus" signifying that some institutions not members of CIC (the Big Ten universities and the University of Chicago) are participating in the program*.

In its third year the board of governors of CIC+ MPME has decided to concentrate its resources on programs that emphasize strong academic preparation and motivation toward engineering for promising students, and that work continuously with students up to their graduation from high school (as opposed to isolated summer sessions, for example). A subsidiary objective will be to work with potentially strong schools to better equip them to prepare students for engineering study through improved courses in science, mathematics, and communications skills.

Programs of CIC+ MPME member institutions reached 8,931 high-school and junior-high-school students, some of them white, during the 1976-77 school year. More than 400 teachers, counselors, and school administrators and some 1,500 parents received exposure to the opportunities and require-

* CIC+ MPME members are the engineering schools of: Illinois Institute of Technology, Indiana University-Purdue University at Indianapolis, Michigan State University, Northwestern University, Ohio State University, Purdue University, University of Detroit, University of Illinois at Chicago Circle, University of Illinois at Urbana, University of Iowa, University of Michigan at Ann Arbor, University of Michigan at Dearborn, University of Minnesota, University of Notre Dame, University of Wisconsin at Madison, University of Wisconsin at Milwaukee, and Wayne State University. The University of Chicago is a member of CIC but not of MPME.

ments of engineering study. The Foundation in 1977 extended its support of CIC+ MPME for one year through a grant of \$400,000, paid to Northwestern University as fiscal agent. Sloan grants for this project through 1977 totaled \$1,547,450.

- Prospects are good for training more minority engineers in California, which has concentrations of technological industries and a large number of secondary schools with substantial enrollments of black, Chicano, and other minority students. Since 1970 the MESA (Mathematics, Engineering, Science Achievement) program of the University of California at Berkeley has been working with secondary schools in the East Bay area to improve their students' chances for scientific and technical careers. MESA students are encouraged to enroll and excel in advanced science, mathematics, and English courses in their schools; they receive special counseling about preparation for college, and they are given special tutoring on a regular basis. They visit centers of scientific and technical activity, and some are placed in summer jobs in such places; others take special summer enrichment courses. More than 80 per cent of MESA's first 220 high-school graduates have gone on to college, and more than two thirds of those have chosen majors in technical fields including engineering, architecture, science, and mathematics.

During 1977 a planning conference was held and other institutions,

California high-school students are encouraged to excel in mathematics, engineering, and science subjects through a growing network of MESA programs. This group is meeting at the School of Engineering of California State University at Long Beach.



public and private, were encouraged to establish MESA programs throughout California. Using the Berkeley program as a model, ten colleges and universities are establishing MESA centers in eight other locations. In some areas two institutions are collaborating, and in some local industries and professional societies are taking an active part. From one center at Berkeley operating in five secondary schools involving 150 students, the over-all program is expanding in the 1977-78 year to nine centers working with 28 secondary schools and 800 students. More centers will be created in coming years; the projection is for 15 centers with 60 schools after five years. The statewide program is expected to reach 3,000 students over a five-year period.

The University of California at Berkeley, whose College of Engineering and Lawrence Hall of Science have been responsible for the MESA program, received a 1977 Sloan grant of \$175,000 for the first year of the expanded program; the William and Flora Hewlett Foundation provided an equal amount. The funds will support part of the cost of the individual area programs and a central coordinating agency at Berkeley. Previous Sloan support for MESA has totaled \$65,525, including \$17,250 in 1977 for planning the MESA expansion.

- The oldest of the regional minority-engineering consortia, PRIME (Philadelphia Regional Introduction for Minorities to Engineering), continued in 1977 to increase the number of secondary-school students in preparation for engineering studies in the Greater Philadelphia area. Its in-school programs involved 1,066 students from the seventh grade up, and 285 of them attended summer enrichment programs at member colleges and universities. PRIME also conducts workshops for teachers to familiarize them with the pre-engineering curriculum modules being produced by the National Coordinating Center for Curriculum Development (see below), for which PRIME-affiliated secondary schools serve as an important testing ground. For some of these workshops, teachers and school administrators come from other cities to benefit from the Philadelphia experience.

Eighty-one PRIME participants graduated from high schools in the last academic year, and 79 per cent of them decided to enter engineering schools.

PRIME's membership embraces nine institutions of higher education including all the engineering colleges of the Philadelphia region; 22 industries, several governmental and quasi-governmental agencies, professional societies, and community groups. It enjoys high-level support in three school districts—Philadelphia, Camden, and Chester Upland—and works with 32 junior and senior high schools in those districts.

The Sloan Foundation in 1977 made a grant of \$125,000 to PRIME, bringing its three-year partial support of this activity to \$310,000.

- Minority freshman enrollment in Texas colleges of engineering is already at 17 per cent but the demographic situation in that state is such that

the minority proportion of the school-age population is 40 per cent (25 per cent Mexican-American, 15 per cent black) and is increasing. Engineering leaders in the state's industries and universities have formed the Texas Alliance for Minorities in Engineering (TAME) with the objective of increasing the minority freshman percentage to approximate school-age population parity over the next decade. TAME is based in the College of Engineering of the University of Texas, Austin, and is guided by a board of directors drawn from industry, engineering schools, minority groups, urban school districts, and concerned individuals.

TAME's method of operation is the establishment of local Alliances, ultimately ten or more, in areas of high minority student concentration. To date four such Alliances have been formed, in the Austin, Houston, San Antonio, and McAllen/Brownsville areas. In each area local industry, schools of engineering, school systems, and community groups work together in developing a comprehensive program of identification, recruitment, counseling, work experience, and preparation of minority students for entry into engineering study.

TAME expects that Texas industry and other sources will be fully supporting its efforts within three years. In the meantime, some help was needed to get the Alliance off to a rapid and effective start. The Foundation made a grant of \$68,500, payable in declining amounts over three years, to TAME. A 1975 Sloan grant of \$11,450 to the Dallas County Community College District supported a workshop which led to the establishment of TAME.

New Curricular Materials

One of the most promising strategies for getting minority secondary-school students interested in and prepared for engineering study involves exposing them to special materials which present problems in mathematics and science based on real-life situations. Properly designed, such small units or modules of instruction can be a valuable stimulus to learning often not found in regular textbooks and conventional classroom teaching. Developing such units is a complex and expensive process involving testing, revision, and evaluation, and requiring much time and effort of specialized personnel.

- The National Coordinating Center for Curriculum Development (NCCCD), established with Sloan support in 1976, has assumed a major share of the task of preparing engineering-oriented materials geared to the interests of minority youth, and of arranging for the trial and evaluation of those materials in urban secondary schools throughout the nation. To this end, NCCCD engages in a number of activities involving cooperation with engineering consortia such as those described above, with other organizations in the minority engineering field, with individual engineering schools, and occasionally with individual secondary schools.

NCCCD is based at the State University of New York at Stony Brook and is directed by Dr. John G. Truxal, former dean of Stony Brook's College of Engineering and Applied Science and director of the College's Program on Technology and Society. Its staff numbers about 19, and it also calls upon curriculum-development consultants as needed. Much of the input for the new materials comes from summer workshops at Stony Brook, at which secondary-school teachers and engineering educators work together in preparing new modules. Inclusion of the teachers in the process helps to insure relevance of the modules to inner-city pupils' needs, and also helps to secure cooperation from the schools in introducing and testing the units, and reporting back suggestions for improvements.

The NCCCD modules, designed for grades eight through twelve, range from self-contained mini-courses to smaller units which can be covered in a few class sessions. Some of them make use of audiotapes and slides as well as printed matter. Simple examples from everyday life introduce elements of algebra, geometry, and trigonometry; in science, a module on energy use in the home has been tested, and modules on earthquakes and solar energy are coming into use. Other modules are designed to strengthen skills in English and communication, and special materials are intended to heighten "engineering awareness" among teachers, counselors, and parents and community groups. NCCCD also develops and adapts projects and activities for after-school science and engineering clubs.

During the 1976-77 academic year NCCCD, usually in cooperation with engineering schools and consortia, worked to bring about the introduction and testing of new materials in Philadelphia, Chicago, El Paso, Atlanta, Washington, D.C., Boston, Houston, and the New York region.

The NCCCD effort is guided by advisory committees of educators and experts on educational materials, evaluation, and policy and planning. As more of the materials come into use, data will be accumulated for analysis and evaluation, and special research studies may be initiated on particular questions that arise. The committees will assist in defining the project's objectives more sharply and in charting its future directions.

For NCCCD's second year the Foundation in 1977 made a grant of \$783,000 to the Research Foundation of State University of New York, bringing support of this project thus far to \$1,558,000.

- The problem of relatively high attrition among minority engineering undergraduates and the special supportive measures needed to retain such students were addressed by a workshop in the Fall of 1977 sponsored by Massachusetts Institute of Technology and the Committee on Minorities in Engineering of the National Research Council. The workshop was partially supported by a Sloan grant of \$20,000 to M.I.T.

Cognitive Sciences

Scientists in several disciplines, including psychology, linguistics, computer science, and neuroscience, believe that by pooling their diverse knowledge they can achieve a more advanced understanding of human mental processes such as memory, perception, and language. The Particular Program in Cognitive Sciences seeks to accelerate this cross-fertilization at some of the most promising centers of such research.

This Particular Program, initiated in 1977, in a sense replaces the former Particular Program in Neuroscience, which was terminated at the end of 1976. Grants in the first year totaled \$776,250 and were made principally for the purpose of bringing together scientists from the relevant disciplines and assessing the present state of knowledge in the field. Four two-year grants were made for programs of workshops and visiting scientists.

- The Center for Human Information Processing at the University of California at San Diego (UCSD) houses research in the cognitive sciences by faculty members of several departments, including psychology and linguistics. The primary component is cognitive psychology with a strong computer orientation. Through a two-year Sloan grant of \$238,000 UCSD will add to this research a group of visiting scholars, for varying periods of time, from disciplines which complement the expertise of the UCSD scientists. A series of small conferences will serve to heighten interdisciplinary communication, as will a final intensive workshop of about six weeks' duration in the summer of 1979. A published volume, summarizing the workshop's findings, is planned.

- At Massachusetts Institute of Technology research in the cognitive sciences is being conducted in the Department of Linguistics and Philosophy, the Department of Psychology, and the Department of Computer Science. M.I.T. is developing a major research and teaching program in the cognitive sciences, looking toward the establishment of an interdisciplinary research

center. A two-year Sloan grant of \$188,000 will enable M.I.T. to invite five advanced visiting scholars to share in its research and will support six workshops on subjects such as the biology of language, speech perception and phonetics, and the development of logical competence in children.

- The University of Texas at Austin will use a two-year grant of \$159,000 for a series of conferences and symposia at which scientists from other institutions will join with its own scientists in efforts to resolve problems at interdisciplinary boundaries. The University reports growing interaction among its linguists, psychologists, and computer scientists; it hopes with the help of the visitors to make progress toward resolving important questions which have been identified in the areas of semantics and feature detectors.

- Yale University has special strength in cognitive sciences in the area of computer science; researchers there have made progress in developing computer models of the step-by-step processes that people employ in understanding stories. This work has aroused interest among cognitive psychologists at other institutions, and it could benefit by their attention, but Yale has had no means of making its computer work readily accessible to psychologists. A two-year Sloan grant of \$134,000 will support a three-week workshop in the summer of 1978, principally for psychologists but also with some representatives of fields such as linguistics and philosophy. The grant also will enable Yale to invite some highly qualified young investigators to spend extended periods gaining familiarity with the computer techniques which its scientists have developed.

Three smaller grants were made in 1977 through the Particular Program in Cognitive Sciences:

Cornell University, Ithaca, N.Y.	\$17,250
For a workshop on the cognitive sciences and brain research at Cornell University Medical College.	
University of Florida, Gainesville, Fla.	\$20,000
In support of a national interdisciplinary symposium on language, mind, and brain, to be held in April of 1978.	
University of Pennsylvania, Philadelphia, Pa.	\$20,000
In support of a series of workshops in the cognitive sciences.	

Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and was incorporated in the state of Delaware. Mr. Sloan, who was for many years the chief executive officer of General Motors Corporation, was active in the affairs of the Foundation until his death in 1966.

The Foundation's basic interests are in science and technology, in economics and management, and in education and problems of society related to those interests. It operates through a General Program and through several Particular Programs, which are designed to concentrate specified resources on a closely defined problem area for a limited period of time.

The Foundation's program interests do *not* extend to religion, the humanities, the creative and performing arts, and medical research except for that conducted at the Sloan-Kettering Institute for Cancer Research. Requests involving activities outside the United States generally are discouraged, and the Foundation does not entertain requests for endowment funds, general support, or buildings, or for equipment which is not directly related to a Foundation-supported project. No grants are made directly to individuals.

Application may be made at any time for support of activities falling within the above guidelines. There are no deadlines and no special application forms except in the Sloan Fellowships for Basic Research. Letters of application usually are addressed to the President of the Foundation, and should state: (1) the specific nature of the problem to be attacked; (2) how the applicant plans to attempt to solve the problem; (3) the name(s) and qualifications of the person(s) to be responsible for the project; and (4) the expected cost and duration of the project. Often a preliminary letter of inquiry will be useful in helping the Foundation staff to determine whether submission of a full proposal would be appropriate.

A grant application should be accompanied by documents indicating the applicant's tax-exempt status and its classification as either a private foundation or a publicly supported organization.

The Foundation is governed by a Board of Trustees assisted by a professional staff. Final disposition of all proposals is the responsibility of members of the Board.

During 1977 Dr. James R. Killian, Jr., Honorary Chairman of the Corporation, Massachusetts Institute of Technology, retired as a Trustee after twenty-two years of service on the Board.

Financial Review



Financial Review

The financial statements and schedules of the Foundation, which have been audited by Haskins & Sells, independent certified public accountants, appear on pages 56 to 71. They include the balance sheets, the statements of income and funds, the statements of changes in financial position, the schedules of administration and investment expenses, the schedule of marketable securities, and the summary and schedule of grants and appropriations.

Investment and other income in 1977 amounted to \$16,567,212, compared with \$14,363,450 in 1976. The net increase of \$2,203,762 was due to higher dividend income in 1977. Investment expenses in 1977 totalled \$342,942, of which \$289,507 represented investment counsel fees. Provision for Federal excise tax amounted to \$644,000 in 1977. These deductions from income totalled \$986,942 in 1977, compared with \$904,470 in 1976.

Net investment income was \$15,580,270 in 1977, compared with net investment income of \$13,458,980 in 1976.

The total of grants and appropriations authorized and administration expenses during 1977 amounted to \$14,735,225, or \$845,045 under net investment income of \$15,580,270. Grants and appropriations totalled \$13,501,831 while administration expenses amounted to \$1,233,394. Over the Foundation's forty-three year history, the cumulative excess of grants and expenses over income has amounted to \$55,343,018.

The total of grant and appropriation payments in 1977 was \$14,008,288, compared with \$12,955,146 in 1976. Together with 1977 administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures in 1977 was \$16,141,311, compared with \$14,912,300 in 1976.

The market value of the Foundation's total assets of \$253,454,907 at December 31, 1977, including marketable securities valued at \$253,211,966, compared with total assets of \$297,704,552 at December 31, 1976. A summary of the Foundation's marketable securities at ledger amount and quoted market value at December 31, 1977 appears on page 61.

A summary of grants by major classifications followed by a listing of grants made during 1977 will be found on pages 66 to 71. Grants and appropriations authorized and payments during the year ended December 31, 1977 are summarized in the following table:

Grants and appropriations authorized but not due at January 1, 1977	\$14,544,273
Authorized during 1977	<u>13,501,831</u>
	28,046,104
Payments during 1977	<u>14,008,288</u>
Grants and appropriations authorized but not due at December 31, 1977	<u>\$14,037,816</u>

Income from investments credited to the General Motors Dealers Appreciation Fund during 1977, after provision for Federal excise tax, amounted to \$283,960. A grant of \$200,000 to the Sloan-Kettering Institute for Cancer Research was authorized and applied against this Fund, as set forth on page 29. Grant payments from this Fund during the year 1977 amounted to \$600,000, resulting in grants outstanding and unpaid at the end of 1977 of \$400,000.

The net worth of the Foundation at December 31, 1977, based on quoted market values, was divided as follows:

	Total Assets At Market Value	Grants and Appropriations Author- ized But Not Due For Payment	Accrued Federal Excise Tax	Fund Balances At Market Value
General Fund	\$249,100,684	\$13,637,816	\$634,681	\$234,828,187
General Motors Dealers Appreciation Fund	4,354,223	400,000	11,576	3,942,647
Total	<u>\$253,454,907</u>	<u>\$14,037,816</u>	<u>\$646,257</u>	<u>\$238,770,834</u>

HASKINS & SELLS

INTERNATIONALLY
DR. LOTTE HASKINS & SELLS

TWO BRONXWAY
NEW YORK, NEW YORK 10004

AUDITORS' OPINION

Alfred P. Sloan Foundation:

We have examined the balance sheets of Alfred P. Sloan Foundation as of December 31, 1977 and 1976 and the related statements of income and funds and of changes in financial position for the years then ended. Our examinations also comprehended the supplemental schedules of administration and investment expenses for the years ended December 31, 1977 and 1976 and the supplemental schedules of marketable securities at December 31, 1977 and grants and appropriations for the year then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements and supplemental schedules present fairly the financial position of the Foundation at December 31, 1977 and 1976 and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Haskins & Sells

January 31, 1978

Balance Sheets

December 31, 1977 and 1976

	<u>1977</u>	<u>1976</u>
Assets		
Marketable Securities:		
Fixed income securities:		
U.S. Government and agency obligations	\$ 42,020,872	\$ 35,380,063
Other	14,607,573	17,382,636
Total fixed income securities	<u>56,628,445</u>	<u>52,762,699</u>
Common stocks:		
General Motors Corporation	43,676,544	44,493,253
Other common stocks	117,438,093	112,110,138
Total common stocks	<u>161,114,637</u>	<u>156,603,391</u>
Total marketable securities (quoted market: 1977—\$253,211,966; 1976—\$297,160,166)	217,743,082	209,366,090
Cash	242,941	544,386
TOTAL	<u><u>\$217,986,023</u></u>	<u><u>\$209,910,476</u></u>

Obligations and Funds

Grants and Appropriations Authorized		
But Not Due for Payment	\$ 14,037,816	\$ 14,544,273
Accrued Federal Excise Tax	646,257	558,944
Fund Balances	<u>203,301,950</u>	<u>194,807,259</u>
TOTAL	<u><u>\$217,986,023</u></u>	<u><u>\$209,910,476</u></u>

See accompanying Notes to Financial Statements.

Statements of Income and Funds

For the years ended December 31, 1977 and 1976

	<u>1977</u>	<u>1976</u>
INCOME:		
Investment income:		
Dividends	\$ 12,922,173	\$ 10,575,393
Interest	3,580,061	3,746,951
Other	64,978	41,106
	<u>16,567,212</u>	<u>14,363,450</u>
Less:		
Investment expenses	342,942	348,470
Provision for Federal excise tax	644,000	556,000
	<u>986,942</u>	<u>904,470</u>
Net investment income	<u>15,580,270</u>	<u>13,458,980</u>
Grants and expenses:		
Grants and appropriations authorized	13,501,831	11,912,295
Administration expenses	1,233,394	1,209,160
Total	<u>14,735,225</u>	<u>13,121,455</u>
Grants and expenses under income for the year	845,045	337,525
Cumulative excess of grants and expenses over income from inception to:		
Beginning of year	(56,188,063)	(56,525,588)
End of year	<u>(55,343,018)</u>	<u>(56,188,063)</u>
PRINCIPAL:		
Balance at beginning of year	250,995,322	243,782,125
Net gain on disposals of securities	7,649,646	7,213,197
Balance at end of year	<u>258,644,968</u>	<u>250,995,322</u>
FUND BALANCES AT END OF YEAR	<u><u>\$203,301,950</u></u>	<u><u>\$194,807,259</u></u>

See accompanying Notes to Financial Statements.

Statements of Changes in Financial Position

For the years ended December 31, 1977 and 1976

	<u>1977</u>	<u>1976</u>
SOURCE OF FUNDS:		
Investment and other income	\$16,567,212	\$14,363,450
Net gain on disposals of securities	<u>7,649,646</u>	<u>7,213,197</u>
	<u>24,216,858</u>	<u>21,576,647</u>
APPLICATION OF FUNDS:		
Grant and appropriation payments	14,008,288	12,955,146
Administration expenses	1,233,394	1,209,160
Investment expenses	342,942	348,470
Federal excise taxes paid	<u>556,687</u>	<u>399,524</u>
	<u>16,141,311</u>	<u>14,912,300</u>
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Change in ledger value of investments	8,376,992	6,502,309
Change in cash balances	<u>(301,445)</u>	<u>162,038</u>
NET CHANGE IN FUNDS	<u>\$ 8,075,547</u>	<u>\$ 6,664,347</u>

See accompanying Notes to Financial Statements.

Notes to Financial Statements

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements have been prepared substantially on the accrual basis of accounting and, accordingly, reflect all significant assets and liabilities. Investment income and investment and administration expenses are recorded on the cash basis, the effect of which on the accompanying financial statements is not materially different from the accrual basis.

Marketable securities purchased are carried at cost; those received by gift or bequest are carried at quoted market value at date of gift or bequest. Gain or loss on disposal of securities is determined generally on the basis of first-in, first-out cost, but in certain instances the identified certificate basis is used. Net gain or loss on disposals is applied to the principal fund.

Grant appropriations are accrued at the time authorized by the Trustees and the Federal excise tax is accrued in the year to which it relates.

2. RETIREMENT PLAN

The Foundation has a defined contribution retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund which provides for purchase of annuities for employees. Retirement plan expense was \$108,408 and \$100,442 for 1977 and 1976, respectively.

3. LEASE

The Foundation occupies its office facilities under a lease which expires April 30, 1985 and provides for annual rentals, including escalation for real estate taxes and operating expenses, of approximately \$205,000 for 1978, net of approximately \$31,000 rental from sublease.

Schedules of Administration and Investment Expenses

For the years ended December 31, 1977 and 1976

	<u>1977</u>	<u>1976</u>
ADMINISTRATION EXPENSES:		
Salaries and employee benefits:		
Salaries	\$ 628,693	\$ 588,062
Employees' retirement plan and other benefits	174,354	164,873
	<u>803,047</u>	<u>752,935</u>
Rent (net of sublease rentals of approximately \$30,000 and \$14,000, respectively)	204,175	212,758
Program expenses	112,881	101,406
Office expenses and services	92,977	118,742
Reports and publications	34,612	28,920
Auditing and legal	39,137	41,133
Total administration expenses	<u>1,286,829</u>	<u>1,255,894</u>
Less: Allocation of administration expenses applicable to investments	<u>53,435</u>	<u>46,734</u>
Balance of administration expenses applicable to grant making	<u>\$1,233,394</u>	<u>\$1,209,160</u>
INVESTMENT EXPENSES:		
Investment counsel fees	\$ 289,507	\$ 301,736
Allocation of administration expenses applicable to investments	53,435	46,734
Total investment expenses	<u>\$ 342,942</u>	<u>\$ 348,470</u>

Schedule of Marketable Securities

December 31, 1977

SUMMARY	Ledger Amount	Quoted Market Value	
		Amount	Percent of Total Investment
Fixed income securities:			
U.S. Government and agency obligations	\$ 42,020,872	\$ 41,251,648	16.3%
Other	14,607,573	14,092,333	5.6
Total fixed income securities	<u>56,628,445</u>	<u>55,343,981</u>	<u>21.9</u>
Common stocks:			
General Motors Corporation	43,676,544	69,162,500	27.3
Other common stocks	117,438,093	128,705,485	50.8
Total common stocks	<u>161,114,637</u>	<u>197,867,985</u>	<u>78.1</u>
Total marketable securities	<u>\$217,743,082</u>	<u>\$253,211,966</u>	<u>100.0%</u>
FIXED INCOME SECURITIES			
	Principal Amount	Ledger Amount	Quoted Market Value
U.S. Government and Agency Obligations:			
Treasury Notes:			
6.25%—February 15, 1978	\$2,500,000	\$ 2,509,766	\$ 2,497,650
7.125%—May 31, 1978	1,000,000	1,004,687	1,000,930
6.875%—May 15, 1980	1,400,000	1,377,687	1,389,500
7.625%—June 30, 1980	2,000,000	2,085,782	2,013,740
7.375%—May 15, 1981	2,100,000	2,088,187	2,095,401
8.00%—May 15, 1982	2,500,000	2,557,188	2,543,750
8.00%—February 15, 1983	1,000,000	1,006,563	1,016,870
7.00%—November 15, 1983	1,700,000	1,676,965	1,656,429
7.25%—February 15, 1984	1,100,000	1,102,922	1,079,023
7.25%—August 15, 1984	2,090,000	2,110,105	2,049,496
7.875%—May 15, 1986	3,252,000	3,498,797	3,273,333

Schedule of

December 31, 1977 (Continued)

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Federal Intermediate Credit Banks Consolidated Bonds 6.95%—January 5, 1987	\$4,770,000	\$ 4,564,294	\$ 4,465,913
Twelve Federal Land Banks Consolidated Bonds:			
5.125%—April 20, 1978	500,000	416,250	496,250
7.15%—July 23, 1979	2,000,000	1,934,375	1,995,000
7.30%—October 20, 1982	1,000,000	1,007,500	987,500
7.35%—January 20, 1997	2,795,000	2,667,478	2,592,363
Federal National Mortgage Association Debentures:			
7.05%—March 10, 1981	1,100,000	1,034,000	1,083,500
7.25%—June 10, 1981	300,000	297,656	295,875
6.65%—June 10, 1982	1,000,000	1,002,500	957,500
7.65%—March 11, 1985	2,000,000	2,030,350	1,967,500
6.05%—February 1, 1988	1,000,000	996,250	858,750
7.00%—March 10, 1992	5,350,000	5,051,570	4,935,375
Total U.S. Government and agency obligations		<u>42,020,872</u>	<u>41,251,648</u>
Other:			
Undivided interest in demand notes:			
Atlantic Richfield Company	151,000	151,000	151,000
General Electric Company	1,233,000	1,233,000	1,233,000
Bank of America N.T. & S.A. Certificates of Deposit:			
6.60%—January 23, 1978	600,000	600,000	599,982
6.90%—July 5, 1978	325,000	325,000	324,831

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Morgan Guaranty Trust Company of New York Capital Notes 6.375%—April 1, 1978	\$1,000,000	\$ 1,000,000	\$ 996,250
Bankers Trust New York Corporation Debentures 6.375%—September 1, 1978	1,000,000	997,500	995,000
General Electric Credit Corporation Notes 7.00%—February 15, 1979	2,000,000	1,995,000	1,990,000
General Motors Acceptance Corporation Debentures 5.00%—September 1, 1980 5.00%—March 15, 1981	1,300,000 1,500,000	1,300,000 1,492,500	1,215,500 1,365,000
American Telephone and Telegraph Company Debentures 4.375%—April 1, 1985	1,500,000	1,518,210	1,256,250
Aluminum Company of Canada, Limited Sinking Fund Debentures 9.50%—March 1, 1995	1,000,000	1,012,500	1,010,000
International Paper Company Sinking Fund Debentures 8.85%—March 15, 1995	1,500,000	1,553,750	1,530,000
Dow Chemical Company Debentures 8.875%—May 1, 2000	1,384,000	1,429,113	1,425,520
Total other		<u>14,607,573</u>	<u>14,092,333</u>
Total fixed income securities		<u>\$56,628,445</u>	<u>\$55,343,981</u>

Schedule of

December 31, 1977 (Continued)

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Allegheny Ludlum Industries, Inc.	67,500	\$ 1,545,009	\$ 1,257,188
Aluminum Company of America	83,000	3,675,225	3,869,875
American Air Filter Company, Inc.	62,000	1,361,260	1,131,500
American Telephone and Telegraph Company	30,000	1,595,517	1,815,000
Baltimore Gas and Electric Company	50,000	1,389,649	1,331,250
BankAmerica Corporation	72,200	1,633,425	1,651,575
Bell Canada	29,400	1,370,323	1,451,625
Caterpillar Tractor Co.	60,000	1,356,699	3,292,500
Champion International Corporation	91,000	2,260,388	1,774,500
Cincinnati Milacron Inc.	41,000	1,418,919	1,752,750
Citicorp	46,000	1,524,025	1,052,250
Coca-Cola Company	40,000	1,624,677	1,490,000
Continental Corporation	44,500	2,116,023	2,380,750
Dow Chemical Company	60,200	1,630,311	1,610,350
Eastman Kodak Company	50,000	1,871,085	2,556,250
Engelhard Minerals & Chemicals Corporation	71,600	2,377,359	1,933,200
Ex-Cell-O Corporation	60,000	1,242,824	1,522,500
Exxon Corporation	88,334	2,355,534	4,251,074
First Bank System, Inc.	40,000	1,891,325	1,430,000
First Chicago Corporation	72,456	753,105	1,340,436
First International Bancshares, Inc.	43,000	1,625,104	1,806,000
General Electric Company	50,000	2,287,451	2,493,750
General Motors Corporation	1,100,000	43,676,544	69,162,500
General Public Utilities Corporation	20,000	422,000	417,500
General Reinsurance Corporation	9,000	1,893,850	1,530,000
Halliburton Company	30,000	932,276	1,953,750
Hewlett-Packard Company	15,000	1,414,022	1,098,750
Illinois Power Company	113,000	2,895,392	2,994,500
International Business Machines Corporation	48,000	5,321,227	13,128,000
Johnson & Johnson	20,000	1,829,399	1,535,000
K mart Corporation	50,000	1,275,391	1,368,750
Lowe's Companies, Inc.	49,400	1,925,350	1,123,850
Marsh & McLennan Companies, Inc.	20,000	954,182	1,222,500
Masonite Corporation	92,600	2,077,161	1,562,625
Merk & Co., Inc.	25,000	369,332	1,387,500

Marketable Securities

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Mobil Corporation	47,000	\$ 1,419,765	\$ 2,990,375
Monsanto Company	35,000	2,407,950	2,016,875
J. P. Morgan & Co. Incorporated	70,000	1,310,880	3,010,000
NLT Corporation	53,800	1,362,425	1,277,750
Panhandle Eastern Pipe Line Company	37,700	1,780,798	1,767,188
J. C. Penney Company, Inc.	59,400	3,696,036	2,108,700
Perkin-Elmer Corporation	81,000	1,852,979	1,620,000
Philip Morris Incorporated	50,000	2,656,207	3,093,750
Pittston Company	68,580	2,227,089	1,594,485
Procter & Gamble Company	25,000	532,772	2,146,875
Ralston Purina Company	115,000	1,610,202	1,638,750
Revlon, Inc.	38,000	1,341,109	1,676,750
Roadway Express, Inc.	55,120	2,447,437	1,736,280
Schering-Plough Corporation	26,000	1,857,586	776,750
Jos. Schlitz Brewing Company	54,000	2,141,719	600,750
Schlumberger Limited	42,600	796,166	3,099,150
Sears, Roebuck and Co.	87,610	1,172,779	2,453,080
Southeast Banking Corporation	45,760	1,139,144	491,920
Southern Railway Company	42,000	2,445,091	2,110,500
Squibb Corporation	51,000	2,305,438	1,217,625
Standard Oil Company (Ohio)	25,000	1,396,401	1,771,875
Stone & Webster, Incorporated	22,200	1,416,413	1,083,582
Superior Oil Company	10,000	2,593,908	2,550,000
Tenneco Inc.	60,600	1,911,467	1,863,450
Union Camp Corporation	49,500	2,204,762	2,283,188
Union Carbide Corporation	41,300	2,647,509	1,693,300
United States Steel Corporation	62,250	2,622,643	1,960,875
United Technologies Corporation	56,900	2,128,924	2,041,288
Warner & Swasey Company	76,300	2,091,272	1,878,888
Weyerhaeuser Company	20,000	543,799	547,500
Wisconsin Public Service Corporation	56,100	1,162,604	1,086,938
Total common stocks		161,114,637	197,867,985
Total fixed income securities		56,628,445	55,343,981
Total marketable securities		<u>\$217,743,082</u>	<u>\$253,211,966</u>

Summary of Grants and Appropriations

	Authorized But Not Due December 31, 1976	Changes During 1977		Authorized But Not Due December 31, 1977
		Authorized	Payments	
Major Grants to colleges and universities	\$ 7,469,650	\$ 7,491,500	\$ 7,717,750	\$ 7,243,400
Other Major Grants:				
American Association for the Advancement of Science	\$ 100,000	—	\$ 50,000	\$ 50,000
American Council on Education	50,000	\$150,000	50,000	150,000
American Economic Association	—	170,000	55,000	115,000
American Enterprise Institute for Public Policy Research	400,000	—	200,000	200,000
Brookings Institution	300,000	300,000	300,000	300,000
Cold Spring Harbor Laboratory	110,000	—	55,000	55,000
Lincoln Center for the Performing Arts, Inc.	150,000	—	150,000	—
Marine Biological Laboratory	26,000	—	26,000	—
Memorial Sloan-Kettering Cancer Center	1,000,000	—	1,000,000	—
National Bureau of Economic Research, Inc.	150,000	—	150,000	—
National Federation of the Blind Inc.	25,000	—	25,000	—
National Fund for Minority Engineering Students	300,000	—	300,000	—
New York Public Library	—	325,000	100,000	225,000
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)	125,000	125,000	125,000	125,000
Public Communication Foundation for North Texas	—	100,000	—	100,000
Rand Corporation	—	250,000	70,000	180,000
Sloan-Kettering Institute for Cancer Research	800,000	200,000	600,000	400,000
TOTAL OTHER MAJOR GRANTS	3,536,000	1,620,000	3,256,000	1,900,000
Other Grants and Appropriations:				
Sloan Fellowships for Basic Research (186 fellowships at 74 educational institutions)	2,329,400	1,562,293	1,560,893	2,330,800
Sloan Commission on Government and Higher Education	—	1,550,000	297,024	1,252,976
Officer Grants	750,000	945,717	770,717	925,000
Book Program	320,194	—	71,950	248,244
Other (none over \$100,000 in 1977)	139,029	332,321	333,954	137,396
TOTAL GRANTS AND APPROPRIATIONS	<u>\$14,544,273</u>	<u>\$13,501,831</u>	<u>\$14,008,288</u>	<u>\$14,037,816</u>

Schedule of

	Authorized	Changes During 1977		Authorized
	But Not Due Dec. 31, 1976	Authorized	Payments	But Not Due Dec. 31, 1977
American Academy of Arts and Sciences		\$ 20,000		\$ 20,000
American Association for the Advancement of Science	\$ 100,000		\$ 50,000	50,000
American Council on Education	50,000	150,000	50,000	150,000
American Economic Association		170,000	55,000	115,000
American Enterprise Institute for Public Policy Research	400,000		200,000	200,000
Arizona, University of	24,600		24,600	
Association of American Universities		15,000	15,000	
Booker T. Washington Foundation		20,000	20,000	
Boston College		14,800	7,400	7,400
Boston University		172,500	73,600	98,900
Bowdoin College	9,700	20,000	29,700	
Brandeis University		20,000	20,000	
British Columbia, University of	7,400	5,067	12,467	
Brookings Institution	300,000	300,000	300,000	300,000
Brown University		48,500	24,250	24,250
California, University of	419,500	967,730	684,480	702,750
California Institute of Technology	144,500	268,800	218,900	194,400
Carnegie Institution of Washington		600,000	200,000	400,000
Carnegie-Mellon University	350,000		200,000	150,000
Case Western Reserve University	135,000		135,000	
Chicago, University of	105,500	400,800	280,900	225,400
City of Hope National Medical Center		15,700	7,850	7,850
Clark University	25,000		25,000	
Cold Spring Harbor Laboratory	110,000		55,000	55,000
Colorado, University of	19,400	14,800	26,800	7,400
Colorado State University	17,200		17,200	
Columbia University	87,100	201,700	162,950	125,850
Committee for Economic Development		7,500	7,500	
Community Television of Southern California		20,000	20,000	
COPUS Research Project		10,000	10,000	
Cornell University	138,300	64,450	126,350	76,400
Corporation for Public Broadcasting		20,000	20,000	
Council for Financial Aid to Education, Inc.		14,000	14,000	
Council on Foundations, Inc.		10,000	10,000	
Council on Library Resources		15,000	15,000	
CUNY Urban Academy for Management, Inc.		75,000	75,000	
Dartmouth College	259,000		166,000	93,000
Denver, University of		298,000	64,000	234,000
Duke University	187,500		100,000	87,500
Eastern Washington State College		18,000	9,000	9,000
Education Development Center		39,950	39,950	

Grants and Appropriations

	Authorized	Changes During 1977		Authorized
	But Not Due Dec. 31, 1976	Authorized	Payments	But Not Due Dec. 31, 1977
Educational Change, Inc.		\$ 18,000	\$ 18,000	
Florida, University of	\$ 19,400	20,000	39,400	
Florida Agricultural and Mechanical University	50,000		50,000	
Fordham University		47,500	10,500	\$ 47,500
Franklin and Marshall College		10,500	30,000	30,000
George Washington University	60,000	20,000	20,000	
Georgia, University of		14,800	7,400	7,400
Georgia Institute of Technology			250,000	250,000
Georgia Tech Foundation, Inc.	500,000			150,000
Georgia Tech Research Institute	150,000	20,000	20,000	
Gustavus Adolphus College		332,900	253,550	193,950
Harvard University	114,600	14,800	7,400	7,400
Houston, University of		29,600	22,200	14,800
Illinois, University of	7,400	14,800	7,400	7,400
Illinois Institute of Technology		18,000	16,400	9,000
Indiana University	7,400			
Institute for Services to Education Incorporated		7,600	7,600	
Iowa State University	7,400	29,600	22,200	14,800
Johns Hopkins University	16,000	33,700	32,850	16,850
Kentucky Research Foundation, University of		15,700	7,850	7,850
Lincoln Center for the Performing Arts, Inc.	150,000		150,000	
Louisiana State University		18,000	9,000	9,000
Maine Maritime Academy		17,500	17,500	
Marine Biological Laboratory	26,000	19,000	45,000	
Marquette University	75,000		40,000	35,000
Maryland, University of		30,500	15,250	15,250
Massachusetts, University of		18,000	9,000	9,000
Massachusetts Institute of Technology	852,700	1,306,500	788,350	1,370,850
Mathematical Association of America (Incorporated)		14,300	14,300	
Memorial Sloan-Kettering Cancer Center	1,000,000		1,000,000	
Miami, University of		255,000	80,000	175,000
Michigan, University of	80,000	5,585	85,585	
Michigan State University	16,000		16,000	
Middlebury College	8,600		8,600	
Minnesota, University of	8,600	21,300	22,500	7,400
Montana State University		20,000	20,000	
Mount Sinai School of Medicine of the City University of New York		15,700	7,850	7,850
NAACP Special Contribution Fund		20,000	20,000	
National Academy of Sciences	66,550	20,000	66,550	20,000

Schedule of

(Continued)

	Authorized	Changes During 1977		Authorized
	But Not Due Dec. 31, 1976	Authorized	Payments	But Not Due Dec. 31, 1977
National Bureau of Economic Research, Inc.	\$ 150,000		\$ 150,000	
National Federation of the Blind Inc.	25,000		25,000	
National Fund for Minority Engineering Students	300,000		300,000	
New Mexico, University of	145,700		110,000	\$ 35,700
New York Public Library		\$ 325,000	100,000	225,000
New York University		290,500	135,250	155,250
North Carolina, University of	67,000		67,000	
Northwestern University	406,050	436,000	596,950	245,100
Notre Dame, University of	400,000	14,800	257,400	157,400
Ohio State University	7,400		7,400	
Oregon, University of		14,800	7,400	7,400
Oregon State University		18,000	9,000	9,000
Oxford, University of		11,000	11,000	
Palace of Arts and Science Foundation		90,000	45,000	45,000
Pennsylvania, University of	50,000	20,000	70,000	
Pennsylvania Association of Colleges and Universities		12,000	12,000	
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)	125,000	125,000	125,000	125,000
Phillips Academy		45,000	45,000	
Pittsburgh, University of	7,400		7,400	
Polytechnic Institute of New York	150,000		75,000	75,000
Princeton University	237,800	258,800	387,200	109,400
Public Communication Foundation for North Texas		104,000	4,000	100,000
Purdue University	134,000	14,800	103,400	45,400
Rand Corporation		250,000	70,000	180,000
Research Foundation of The City University of New York		10,140	10,140	
Research Foundation of State University of New York	297,100	815,800	693,800	419,100
Rice University	18,300	18,000	27,300	9,000
Rochester, University of	54,800	14,800	62,200	7,400
Rockefeller University	19,400	5,000	24,400	
Rutgers University	18,300	19,400	37,700	
Salk Institute	9,700	82,800	61,100	31,400
SIAM Institute for Mathematics and Society	58,000	66,000	63,000	61,000
Simmons College		114,000	114,000	
Sloan-Kettering Institute for Cancer Research	800,000	200,000	600,000	400,000
South Carolina, University of		29,600	14,800	14,800
Southern California, University of	7,400	32,800	23,800	16,400
Southern Methodist University	125,000		125,000	
Southern Regional Education Board		72,300	72,300	

Grants and Appropriations

	Authorized	Changes During 1977		Authorized
	But Not Due Dec. 31, 1976	Authorized	Payments	But Not Due Dec. 31, 1977
Stanford University	\$ 867,400	\$ 121,104	\$ 556,854	\$ 431,650
Stony Brook Foundation, Inc.		33,267	33,267	
Swarthmore College		165,000	65,000	100,000
Syracuse University	150,000		75,000	75,000
Teachers Insurance and Annuity Association of America		15,000	15,000	
Tennessee, University of	9,700		9,700	
Texas, University of	159,000	192,700	155,850	195,850
Texas Alliance for Minorities in Engineering, Inc.		68,500	40,000	28,500
Texas A&M University	8,600		8,600	
Toronto, University of		47,600	23,800	23,800
Tulane University		350,000	50,000	300,000
Utah, University of		18,000	9,000	9,000
Vanderbilt University	54,000		54,000	
Virginia, University of	71,000	15,700	43,350	43,350
Virginia Polytechnic Institute and State University		18,000	9,000	9,000
Warwick, University of		5,000	5,000	
Washington, University of	23,400	36,000	41,400	18,000
Washington Center for Learning Alternatives		35,000	35,000	
Washington University	169,400	150,000	144,400	175,000
Wayne State University	16,000		16,000	
Wesleyan University		20,000	20,000	
William and Mary, College of	16,000	165,000	50,000	115,000
Williams College		79,700	79,700	
Wisconsin, University of	79,700		11,000	
Worcester Polytechnic Institute	11,000		11,000	
Yale University	445,700	477,100	527,400	395,400
Yeshiva University	110,000		110,000	
Sloan Commission on Government and Higher Education		1,550,000	297,024	1,252,976
Sloan Fellowships for Basic Research to be granted in ensuing year	1,550,000			1,550,000
Officer Grant appropriation for grants in ensuing year	750,000	100,000		850,000
Book Program	320,194		71,950	248,244
Other appropriations for grants and related expenses	14,479	4,521	16,104	2,896
	<u>14,544,273</u>	<u>13,544,014</u>	<u>14,050,471</u>	<u>14,037,816</u>
Reduction for Grant Transfers		42,183	42,183	
TOTAL GRANTS AND APPROPRIATIONS	<u>\$14,544,273</u>	<u>\$13,501,831</u>	<u>\$14,008,288</u>	<u>\$14,037,816</u>

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ALFRED P. SLOAN FOUNDATION

630 FIFTH AVENUE
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NEW YORK, N.Y. 10020

REPORT FOR 1978

The Alfred P. Sloan Foundation's Report for 1978 accounts for new grants and appropriations totaling \$13,314,469. The report is the last to be issued under the direction of Nils Y. Wessell, who will retire as President of the Foundation on April 30, 1979. His successor is Albert Rees, an educator who has headed departments of economics at the University of Chicago and Princeton University. Mr. Rees also served as provost of Princeton, and for a year in 1974-75 was director of the Council on Wage and Price Stability in Washington.

The Foundation's major 1978 commitments were divided among its principal fields of interest as follows:

Science and Technology	\$3.8 million
Economics and Management	\$2.1 million
Education for the Public Service	\$1.8 million
Minority Engineering Education	\$3.1 million
Cognitive Science	\$1.1 million

Mr. Wessell, in his President's Statement, assesses the impact of economic and social changes, particularly inflation, on Sloan and other foundations during his eleven years as President. He was president of Tufts University and of the Institute for Educational Development before joining the Foundation.

The Foundation's total grants and appropriations authorized and administration expenses during 1978 came to \$14,608,336. This was \$1,084,147 less than net investment income; however, cumulative grants and expenses have exceeded income by more than \$54 million since the Foundation was established in 1934. The Foundation's assets totaled \$244,599,756 at market value at the close of 1978. This compared with \$253,454,907 a year earlier.

April 16, 1979

Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr. (1875-1966)

Report for 1978

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* Resigned December 31, 1978

President's Statement



President's Statement

This is my last opportunity to express my views in an annual report of the Alfred P. Sloan Foundation. There is much that could be said about the profound changes that have rendered the world of 1968, when I assumed this position, almost unrecognizable from the perspective of 1979. But since the onrush of change shows no signs of slowing, anything I might say about the state of society and the world now would sound hopelessly dated before another decade has passed.

So I content myself with a more modest subject, the effects of economic and social changes on philanthropic foundations, and on the Sloan Foundation in particular. I bring to this task the ambivalent experience, which is not unusual in foundation circles, of having been both the university administrator/supplicant and the philanthropoid who dispenses both wisdom and grants, not necessarily in equal measure.

Even in 1968 it was evident that the role of foundations in society was due for drastic changes. The critical scrutiny of foundations which helped to bring about the Tax Reform Act of 1969 has abated, and most foundations have learned to live with the requirements of that Act. What was less apparent then, but is glaringly obvious now, is that the increasing dominance of government funds in support of higher education, scientific research and training, and social-welfare programs threatens to make foundation efforts in those fields minuscule by comparison and of decreasing impact. The present danger to foundations is not overzealous tax collectors but the prospect that foundations may come to be regarded as harmless anachronisms, deserving of neither censure nor praise, but merely tolerated. This holds true, I regretfully believe, even at a time when a number of new foundations, quite large by previous standards, are entering the philanthropic marketplace with grant-making capacities several times that of a foundation like Sloan. What, one wonders, is even \$50 million a year compared to the billions dispensed annually by the Department of Health, Education and Welfare and the National Institutes of Health?

For the Sloan Foundation, with its basic interests in the "hard" sciences and economics and, following from those interests, in technology and management, the increasing dependence of science and higher education on government support has had some very specific implications. In higher education the federal government has largely assumed the responsibility for direct student aid, whether through grants-in-aid or loans. In current dollars, this investment amounted to approximately \$1.1 billion in Fiscal Year 1968, and had risen to over \$7.3 billion in Fiscal Year 1977. It is true that little of this money has been in programs which coincided with activities of the Sloan Foundation, but it is certainly true that taken all in all the importance of private philanthropic funds to academic institutions has sharply diminished. Academia has learned rapidly to turn first to the federal government.

The federal investment in science, measured in current dollars, has also increased enormously. Leaving aside the National Institutes of Health, where the increase has been largest, support for scientific research in general has increased from \$3.7 billion in Fiscal Year 1968 to \$6.4 billion in 1977. The period has long since passed when any foundation, even those which may measure their assets in the many hundreds of millions or in the billions, can make any major contribution to the general support of scientific research. "Big science," with its accelerators, satellites, and huge research teams, must find its support from the public treasury.

The figures just cited are somewhat deceptive in that they conceal the most important development of the last decade, the development which has most strongly affected the Sloan Foundation. Federal expenditures were stated in current dollars, a procedure which no longer makes good sense. The dollar has simply not been the same from year to year, and it is a dangerous illusion to pretend that it is. For this Foundation, as for nearly all foundations, the steady erosion of the dollar has been aggravated by the failure of the investment market to compensate in any fashion. In financial terms the Sloan Foundation is simply not the institution it was as recently as ten years ago.

In terms of the 1967 dollar, the worth of the 1978 dollar was somewhere in the neighborhood of 50 cents. A grant of \$1 million in 1978 was, in real terms, the equivalent of a grant of \$500,000 in 1967. Moreover, the value of the Foundation's assets has diminished in *current* dollars since 1967. The year-end average value of the Foundation's assets for the five-year period 1967-1971 was very nearly \$321 million. The year-end average value of the five-year period 1973-1977 was \$261 million. Even if the recession year 1974 is omitted (at the end of 1974 the portfolio value stood at \$202 million) the average over the 1973-1977 period comes to \$275 million. And to measure the loss in current dollars is of course misleading. In real 1967 dollars, the value of the Foundation's assets fell from \$326 million at the close of 1967 to \$145 million at the close of 1977.

Thus the notion, to which I alluded in the Report for 1969, that founda-

tions were growing so rapidly as to become an "invisible government," has long since been proved mistaken. One seldom hears any longer the complaint that foundations have too much power. For most of the long-established ones, and certainly for this one, the question has become whether they are to retain any constructive influence at all in the new era of scarcity.

New Strategies Are Needed

In the new circumstances we must sharpen our tools and devise new strategies for doing more with less. It is no longer enough for a foundation to make known its program interests (if it can accomplish that amid the clutter of modern communications), sit back, and wait for scintillating proposals to arrive. The quality of proposals generated by this means appears to have declined in recent years, at least so far as this Foundation is concerned.

At Sloan we have tried consciously to adopt a more active stance, identifying problem areas and promising developments as specifically as we can, and inviting proposals from institutions which seem best equipped to deal with these matters. Thus, early in the decade, a number of engineering schools were encouraged to broaden the technical and scientific training of future engineers to include consideration of the economic, social, and political factors involved in engineering decisions. In 1974 we announced a refocusing of the Foundation's interest in economics, placing emphasis on research and graduate training in microeconomics; such research and training is now flourishing in ten leading graduate departments of economics. Following logically and perhaps inevitably upon those developments came the formal adoption as a program interest in 1976 of education for the public service, a newly coalescing field which includes elements of management, economics, technology, political science, some newer quantitative methods, and much else.

In each of these instances the Foundation has made use of an asset which does not appear on the balance sheet—the willingness of outside scientists and scholars in the highest ranks of their disciplines to serve as advisors in shaping and implementing programs which they felt were important. For some programs they have constituted formal advisory committees; in all cases they devote considerable time to identifying promising new areas of activity and helping to evaluate proposals. These are invaluable services which mere money cannot buy; they are available only so long as a foundation is seen to be making creative and constructive contributions in its chosen fields.

The Foundation initiatives mentioned thus far have been in the area of the Foundation's General Program, which stems from traditional interests. Since 1969 the Foundation also has operated in all five Particular Programs, in which we try to pinpoint certain problem areas and opportunities even more precisely and stimulate some momentum toward their resolution or fruition as the case may be. Each Particular Program has been purposely limited to a total investment of \$10 million to \$15 million over five to seven

years, after which the program is terminated and those funds applied to some other subject. Particular Programs usually arise from within the traditional interests of the Foundation, but some also represent extensions of or even departures from those interests.

While the Particular Program concept may not be adaptable to every foundation's interests or style, these programs generally have been a rewarding experience for the Sloan Foundation and, we trust, for the grantees who participated in them. The Particular Program in Neuroscience, somewhat of a departure in supporting the study of the physiology of behavior, seems to have given that vibrant new discipline a helpful push at a crucial time. The program in Minority Medicine and Management Education was reasonably successful within its limitations and helped lay the basis for the current program in Minority Engineering Education, on which the jury is still out. Under Technology in Education some interesting instructional experiments were carried out, and now in Cognitive Science the resources of some powerful new disciplines, and some old ones in modern forms, are being mobilized to attempt a comprehensive understanding of human mental processes upon which all of our efforts in education ultimately rest.

The Problem of Defining Problems

In the search for new Particular Program topics, it has become apparent that many interesting problems do not come as neatly packaged as one would like. Some subjects are simply too amorphous or diffuse to be amenable to such concentrated, short-term approaches. That proved to be true of Technology in Education, and it has been true thus far of the problem of the decline in expository writing skills, on which the Foundation's staff and its advisors have spent much time and thought (albeit few dollars) without, up to now, being able to formulate a coherent program. Similarly, it is not clear just what should be done next to open up more educational opportunities for minority youth, a subject in which the Sloan Foundation has been involved for two decades.

One thing the past decade has taught us is to be wary of the old assumption that once a foundation has successfully "demonstrated" a new scientific, educational, or social program, government funds would or should pour in to vastly expand and multiply that constructive effort. Sometimes this still happens, as with neuroscience; sometimes it does not, as in minority engineering education. In any case, governmental enthusiasm for particular causes has a way of fluctuating and creating painful perturbations in the careers and professional activities of those who are dependent on it.

Curiously enough, the Sloan program which appears most immune to government "competition" is in the field of basic science, where the federal influence is at its most pervasive. The Sloan Fellowships for Basic Research, the result of an early Foundation initiative, are now in their 24th year, and

it is a rare foundation program that survives the currents of change essentially unaltered for that length of time. But every evaluation of the program has returned the same verdict: the relatively modest amounts, and the accompanying recognition, which the Fellowships have provided to promising young scientists at the beginning of their independent research careers, were indispensable to their future professional development. Perhaps federal funding agencies cannot afford to bet on very young scientists having no proven track records; the Foundation, with the help of a committee of knowledgeable senior advisors, can take that risk. The Sloan Research Fellows as a group, some 1,485 now, have more than justified the early confidence placed in them. (One is now the science advisor to the President.)

It appears to be impossible to write about foundations and philanthropy without frequent glances over the shoulder at what government is doing. The mouse has to watch where the elephant is going to step. The relationship between government and foundations may always be an uneasy one, but it is no longer the adversary relationship that we saw in 1968, when all foundations were under fire for the indiscretions of a few. A decade later, in the year of Proposition 13, the object of public disenchantment was government itself.

Toward Better Government

We have traveled far down the road of assigning responsibility for all problems to government—too far, perhaps, even to be able to recall the kind of limited government envisioned by the Founding Fathers. But there must be ways of making big government more responsive and efficient. Graduates of programs in education for the public service will bring new combinations of skills to the administration of governmental affairs, and the new breed of microeconomists will contribute basic information in such areas as transportation, housing, and public finance to the formulation of more effective public policies.

There is also room for an occasional objective appraisal of a significant public-policy issue. The Sloan Commission on Cable Communications in 1971 endeavored to assess the future impact of cable television and its associated technologies on society, and to define a course of action for its full development in the public interest. Currently the Sloan Commission on Government and Higher Education is studying the tangled relationships which have grown up as universities have become increasingly dependent on government support with its inevitable regulations and restrictions. Both of these commissions have been composed of leading citizens from many walks of life, supported by independent staffs, and enjoying the cooperation of interested government officials.

There remains useful work for foundations to do, even for those in reduced circumstances; but for many it will not be the kind of work they have been accustomed to doing, and the inroads of inflation on philanthropic pur-

chasing power will mean that dramatic results will occur less frequently. If foundation boards and staffs are not too wedded to the old ways, and can make adjustments and redefine missions in realistic terms, foundations will continue to play a constructive role in American life. It is possible to foresee that economic and social changes in the decade to come will be even more momentous than those of the decade just past. The task of steering the Sloan Foundation through those changes to come I leave to my successor.

In one other respect the Sloan Foundation will be a different place in the years ahead. Warren Weaver died on November 24, 1978. The loss of his inspiration and counsel, which the Foundation enjoyed for more than two decades, will be deeply felt by all who had the privilege of working with him.

Probably no one person is qualified properly to assess all that Dr. Weaver contributed in his 84 years to science, education, and philanthropy. He was first of all a teacher, a mathematician. Later, as an executive of the Rockefeller Foundation, he foresaw the impact that physics and chemistry would have on biology and genetics, and directed support to those scientists who were to bring about the revolution in biology. His mathematical work during World War II helped reduce Allied losses and brought him high governmental honors. After the war he was active in redirecting the nation's scientific effort to peacetime uses and in establishing a system of government support for it. When the Rockefeller Foundation decided to attack the problem of world hunger, he became deeply involved in the green revolution.

At the urging of Mr. Sloan he became a Trustee of this Foundation in 1956 and a vice president in 1959. Here his long-standing concern for a better understanding of science by the public and his interest in more fruitful applications of mathematics came to be reflected in the Foundation's program interests. During his years at the Sloan Foundation he completed several of his many and varied books, including *Lady Luck*, *Alice in Many Tongues*, *Scene of Change*, and *U.S. Philanthropic Foundations*. He retired as a vice president in 1964 and as a Trustee in 1967, remaining a consultant until his death.

Warren Weaver profoundly influenced the course of American science. He will be remembered by many persons for many different achievements in his long career. At the Sloan Foundation we will remember his wit, his verve, and his unflinching ability to get directly to the heart of the matter. He is truly irreplaceable.

January 1979

Wesley C. Weaver

General Program



General and Particular Programs

The Alfred P. Sloan Foundation conducts its operations through a General Program, which reflects its established interests in science and technology, economics and management, and related subjects; and a set of Particular Programs, which focus on more sharply defined topics for limited periods of time. Typically a Particular Program involves an expenditure of \$10 million to \$15 million over five to seven years.

The Foundation's fourth and fifth Particular Programs, in Minority Engineering Education and in Cognitive Science, were in operation in 1978. Previous Particular Programs, now phased out, dealt with Minority Medicine and Management Education, Technology in Education, and Neuroscience. While the Foundation no longer allocates funds specifically for these superseded subjects, it continues to make occasional grants in these areas through the General Program.

Education for the Public Service

The growing interest of students and faculty members in becoming engaged with real and pressing issues of public policy was one of the encouraging trends of 1978. Broadly based, multidisciplinary programs of education for the public service offer hope that a new generation of policy analysts and decision makers will be equipped to mount a rigorous and comprehensive attack on problems which have resisted simplistic solutions.

Programs of this nature are becoming well-established at the graduate level in a number of major universities, some of which also offer undergraduate instruction in the field. Now some four-year colleges are developing full programs of policy-oriented studies; some believe this can bring a new focus to liberal education, demonstrating the uses of critical and analytical thinking not only for future practitioners of the policy sciences but also for the citizenry at large.

Sloan commitments in 1978 for graduate and undergraduate programs of education for the public service, both new and existing, and for related and supporting activities came to \$1.8 million. Earlier activities in this field are discussed in the Foundation's Reports for 1976 and 1977.

Undergraduate Programs

- Oberlin College is instituting a Public Service Studies Program, to be offered as a special field of concentration for students taking majors in other subjects. The program will require some basic courses in such subjects as microeconomics, political analysis of public policy, statistical methods, and decision theory; one or more electives in applied policy studies, and an internship in a public-service agency or organization. An innovative feature of the



Three students in the Public Service Studies Program at Oberlin College confer with Prof. Paul A. Dawson (seated), program director, and Keith Boone, program administrator.

Oberlin program is the senior workshop, in which students will bring to bear on a major public-policy issue all that they have learned previously, while acquiring additional knowledge and skills as required by the subject. Topics of the workshops will be announced two or three years in advance, so that students will have time to take the needed courses in preparation for them. A workshop in environmental policy, for example, would require some background in biology; other disciplinary skills would be needed for such subjects as energy policy, health care, poverty, and government regulation of industry and science.

The Oberlin program involves faculty from a variety of disciplines; in addition to the social sciences, the natural sciences and the humanities will contribute to an examination of the technological and ethical aspects of policy issues. Persons active in policy analysis and policy making will be brought to the campus to lend their perspectives to the workshops and other courses.

Oberlin requested support primarily for a small expansion of faculty which is needed to get the new program under way. The Foundation made a grant of \$280,000 for the first two years of the Public Service Studies Program.

- "The true goal of a liberal arts education is not the production of

specialists, but the development of intelligent, critical and responsive persons. We expect students to apply knowledge learned in one context to others, to deal with new and unforeseen problems, and to make judgments rather than simply have opinions." Lawrence University believes that its new interdisciplinary program in public-policy analysis will help it achieve those educational objectives.

Lawrence, in Appleton, Wisconsin, is focusing its public-policy program on four topics: environmental problems, energy policy, health services, and urban studies. Basic courses in microeconomics, statistics, and political science are prerequisites for this concentration; so is familiarity with a computer. The core of the program will consist of four new courses, including mathematical modeling and administrative behavior, and a natural-science course selected by the student. An internship will expose the student to the realities of life in a corporation or government agency involved in policy questions. Finally, an advanced seminar in public policy, conducted by faculty members from the relevant disciplines, will test the student's ability to apply his newly acquired skills and knowledge to a concrete policy problem in one of the four topical areas.

The Lawrence program will involve thirteen faculty members and a newly appointed specialist in public policy. To cover the first two years of the additional expenses created by the program, the Foundation made a grant of \$160,000.

- Dartmouth College has established an undergraduate major in policy studies, and reports an enthusiastic response by students. The program focuses on problem identification and analysis; ethical and social aspects of policy choice; and policy implementation and evaluation. It is based in the disciplines of economics, political science, mathematics, and philosophy, and Dartmouth's schools of engineering, medicine, and business administration are expected to contribute to the program also. Six core courses and four electives in policy studies are required for the major, and internships are provided.

The Dartmouth program needs time for faculty members in several disciplines to develop new and revised courses. Many of the new courses will be taught by multidisciplinary teams, requiring increased instructional support. For these and other initial expenses, the Foundation made a one-year grant of \$150,000.

- Undergraduate instruction in public policy analysis has been offered on a small scale by the University of North Carolina since 1970; a student now may take a major in public policy there, and a faculty committee is working toward an independent degree program. Toward this end the faculty proposes to develop a broad range of new courses specifically tailored to the needs of public-policy students. Case studies of public-policy problems developed elsewhere, often with Sloan support, will be examined for their suit-

ability for North Carolina students, and opportunities for internships, which are now optional, will be expanded.

The program at North Carolina, a public institution, differs in some of its emphases from those at the private colleges and universities. Many or most baccalaureate graduates of the latter programs proceed to graduate studies, whether in policy analysis or in the more established professions. The University of North Carolina at Chapel Hill traditionally has drawn most of its students from within the state, and has supplied much of the political and governmental leadership of the state. It anticipates that many of its students who have attained a bachelor's degree with the major in public policy will move directly into state and local government, perhaps returning for an advanced degree later; others will find their grounding in policy analysis useful in a variety of other careers.

For strengthening and expanding its undergraduate program in public policy analysis, the University of North Carolina received a two-year grant of \$166,000.

- Massachusetts Institute of Technology launched its undergraduate program in public policy in 1977, with Sloan assistance for the first year of operation. The program is under the aegis of the Department of Political Science, with the cooperation of several other M.I.T. departments and schools. First-year enrollments were encouraging, and a variety of new courses and concentrations are being developed. The Institute has approved the offering of an undergraduate major in public policy.

In most public-policy programs there is a need to improve students' mathematical skills and their understanding of science and technology. Most M.I.T. students, preparing for careers in science and engineering, are well-equipped to assess the quantitative and technical factors in policy making. The M.I.T. program focuses on the unquantifiable elements, such as social pressure and political compromise, which influence government policy decisions.

The Foundation made a two-year grant of \$200,000 to support the further development of the undergraduate public-policy program at M.I.T.

- A liberal arts program in policy studies is in the planning stage at Occidental College, Los Angeles, assisted by a \$19,500 grant from the Sloan Foundation.

Graduate Programs

- Since it opened in 1970 the Lyndon B. Johnson School of Public Affairs of the University of Texas at Austin has become one of the largest graduate programs in education for the public service. Its two-year program has a current enrollment of 152 and is expected to reach its limit of 200 before long. The School under its new dean, Elspeth Rostow, is seeking to



At the Lyndon B. Johnson School of Public Affairs of the University of Texas at Austin, Prof. Kenneth Tolo (center) meets with students to discuss a policy research project.

effect major improvements in its curriculum at a time when the demand for its services is increasing, its budget has been reduced, and of course the inroads of inflation are continuing.

The LBJ School feels that its first-year core curriculum could be strengthened by development of additional course materials and the exchange of such materials with other schools of its kind. For the second year of study, it wants to strengthen the analytical component of the curriculum and to offer advanced students a choice of two "tracks," one in policy analysis and the other in public management. Summer internships required between the two years would be assigned on the basis of which second-year track the students select.

The School also plans to begin offering special Summer programs in 1980 and 1981, for persons seeking additional training in policy analysis and public management. At present its faculty and facilities are underutilized in Summer, when the regular students are away on internships. In the state government at Austin and elsewhere, there may be persons involved in policy problems who would welcome an opportunity to improve their skills in a six-week Summer session.

In support of these developments at the Lyndon B. Johnson School the Foundation made a three-year grant of \$200,000 to the University of Texas at Austin.

- Duke University's Institute of Policy Sciences and Public Affairs has been in the forefront of education for the public service since early in this decade. It offers a master's degree in public policy to students who are also working toward advanced degrees in other fields such as law and medicine; past Sloan support has helped bring into being joint degree programs also with business administration and with engineering. A two-year master's degree program in public policy alone is being developed.

The Institute of Policy Sciences also conducts a sizable undergraduate program and has served as a focal point for gatherings of scholars and policy makers designed to expand and disseminate knowledge of the policy sciences. Its support through the regular University budget has grown significantly, but for the next several years it will remain partially dependent on outside grants to maintain its full range of activities. To assist the Institute through this transitional period the Sloan Foundation made a two-year grant of \$160,000 to Duke University.

Research and Publication

One of the hallmarks of a profession is a well-defined body of knowledge which is shared by its members. As public policy analysis begins to emerge as a new profession, its students, teachers, and practitioners are in need of substantive information developed through research, and a means of sharing this information within their own intellectual community. Two Sloan grants in 1978 were directed toward those objectives. (The parallel need for broadly useful case studies and other teaching materials was addressed by Sloan grants in previous years.)

- Studies of the nation's energy situation have multiplied since the Arab oil embargo and the resulting energy "crisis" of 1973-74, but the nation still lacks an effective energy policy. A group of distinguished economists, political scientists, and policy analysts wants to find out why. They pose a number of questions for study, among them: "Have any of the growing number of energy analyses been seriously regarded and included in national-level energy discussions and the setting of policy?" and "Why have these analyses not been more successful in guiding national priorities and directing concerted action toward the solution for energy problems?"

The new study, in short, seeks to determine what use was made of previous analyses, what makes a policy analysis useful, what role formal modeling should play in policy analysis, and how insights gained through modeling can be more effectively communicated to decision makers. The investigators will examine a selected set of energy policy analyses and will interview policy analysts and policy makers involved with them, with a view to recommending improvements in the use of formal analyses in government decision making and policy formulation.

The research project, entitled "The Use and Misuse of Energy Policy Analyses by the Federal Government," will be based at Resources for the Future, in Washington, D.C. Its director is Martin Greenberger, an applied mathematician at Johns Hopkins University who has long been interested in decision making and policy analysis. Other principal investigators are Garry D. Brewer, associate professor of organization and management, Yale University; William W. Hogan, executive director of the Energy Modeling Forum, Stanford University, and Alan S. Manne, professor of operations research, Stanford University. Numerous other economists, public policy specialists, and natural scientists will contribute to the study, which is to be completed by the end of 1979. It is being partially supported by a \$200,000 Sloan grant to Resources for the Future.

• Since 1975 the quarterly journal *Policy Analysis* has been a principal means of communication among educators and practitioners in its field. Its editors seek out exemplary pieces of public policy analysis, adapt them for publication, and give them a wider audience. The journal also publishes reports on successful teaching programs, and is used at many institutions in teaching graduate public policy courses.

Policy Analysis originated in the Graduate School of Public Policy of the University of California, Berkeley, and will remain there for the time being. It is published by the University of California Press. The Berkeley School invited other schools in its field to join in the management of the journal, and thus far five have agreed to do so, forming an advisory board to oversee the publication and to help determine its content. The five are Duke University, Harvard University, the University of Michigan, the Rand Graduate Institute, and the Stanford Graduate School of Business.

Like most such journals, *Policy Analysis* needs some subsidy to survive through its early years. The Sloan Foundation agreed to provide \$150,000 over a three-year period, payable to the University of California, Berkeley.

These other grants were made in 1978 for education for the public service and related activities:

Association of American Colleges, Washington, D.C. \$6,000
In support of an issue of *Forum for Liberal Education* on undergraduate public-policy programs.

Baruch College, New York, N.Y. \$17,600
In support of a conference on reform of civil-service regulations in state and local governments to encourage the entry of graduates of programs in public policy and public management.

Boston College, Chestnut Hill, Mass. \$15,000
To assist in establishing an Institute for Public Service in the College's School of Management.

Boston University, Boston, Mass. \$19,900
In support of an Education for Public Service Clearinghouse Study.

Harvard University, Cambridge, Mass. \$20,000
In support of research by Stephen Hitchner in the field of public management at the John F. Kennedy School of Government.

University of Maryland, College Park, Md. \$20,000
For planning the development of a public policy program.

Massachusetts Institute of Technology, Cambridge, Mass. \$13,500
For a workshop leading to a special issue of *Policy Sciences* devoted to the topic of technology and public policy.

The Rand Corporation, Santa Monica, Cal. \$12,500
For supplementary support of a summer 1978 workshop on the use of case materials in public policy education, conducted by the Rand Graduate Institute and the Duke University Institute of Policy Sciences and Public Affairs.

Rice University, Houston, Tex. \$20,000
For initial planning of a full public-management concentration within the Master of Business and Public Management degree at the Jesse H. Jones Graduate School of Administration.

Economics and Management

Economic problems continued to command a major share of public attention in 1978, and the Foundation continued its support of programs of research and training which may contribute to solutions of some such problems. Two innovative programs of management education also received support, and the Foundation renewed its contribution to the training of selected journalists in economics.

Workshops in Microeconomics

Beginning in 1974, the Foundation upon advice of a panel of consultants in economics has made a series of grants to leading university graduate departments of economics to encourage research and training in microeconomics. The purpose is to strengthen that part of economics which—in contrast to macroeconomics—deals with practical problems faced by managers, entrepreneurs, and public servants in specific industrial and market situations. The means employed has been the creation of faculty-graduate student workshops focused on specific problems; through close interaction with leading economists of varied interests, and sometimes with faculty members from other disciplines, Ph.D. candidates are encouraged to develop interests in microeconomics questions which will continue through their careers as teachers or as practicing economists in private or public employment.

The Foundation has made ten grants for this purpose, all for \$210,000 over three-year terms. Eight of them expired in 1978 and were renewed, each at \$140,000 over two years. This process afforded an opportunity to assess the progress made thus far and to learn of the departments' plans for the future.

- The University of California, Berkeley, is developing a Ph.D. program in the economics of transportation. During its first three years the program has assisted 31 graduate students in their research projects; six members

of the economics faculty have taken a leading part in the workshop, and professors of civil engineering and business administration also have participated. Studies are under way or proposed in many aspects of transportation—public rapid transit, airlines, waterways, intercity freight—and in its effects on urban location and economic development. Berkeley is negotiating for support of its transportation studies from another source after Sloan support expires in 1980.

- The University of Chicago's Department of Economics is breaking new ground with a workshop in the microeconomics of the family. Economic analysis of "transactions" within the family has required the development of new conceptual tools and points of view about such matters as marriage, divorce, alimony, polygamy, family migration, fertility, altruism in the family, and the treatment by parents of children with different talents. The work has attracted the interest of sociologists and anthropologists, and may have an impact on those and other fields such as law and education. The Chicago workshop, directed by Gary S. Becker, has enrolled about 39 pre- and postdoctoral students in three years; 20 faculty members and seven research associates also have participated.

- Columbia University's workshop has focused on topics in labor economics, specifically the relation between job mobility and wages of movers and stayers; the relation between job mobility and unemployment; and the earnings and labor market behavior of women. Columbia intends to extend research by faculty and graduate students along these lines, through empirical analysis of bodies of longitudinal data. Several young faculty members have been attracted to empirical work since the first grant was made.

- At Massachusetts Institute of Technology the workshop is concerned with public control of economic activity. Much of this research is focused on noncompetitive markets and regulated industries, in which public policies have direct effects. The general question is not whether government intervention in the economy is needed, but the nature of the institutional process by which that intervention occurs and what its effects are. The goal is not to develop a general theory but to generate a set of questions and problems which need to be considered in each instance of actual or proposed intervention. Many particular problem areas come in for study under this rationale, including the U. S. Postal Service, rent control, hospital technology, laid-off workers, illegal immigration, and others.

- The Princeton University workshop concentrates on human resources in the urban economy, particularly urban economics, labor economics, and public finance. In these areas new analytical and statistical tools applied to larger and much-improved sets of data are allowing economists to study human-resource questions which have not been asked before. Examples are choice of residential location in relationship to place of work, housing costs, and taxes and expenditures of local governments; economic effects of land-use



Sloan-assisted microeconomics workshops on the voluntary nonprofit sector and on state-local fiscal relationships are conducted at the University of Wisconsin-Madison. Prof. W. Lee Hansen, left, and Prof. Burton A. Weisbrod, right, advise graduate students.

controls; effects of federal grants on local governments' budgetary behavior; effects of tax-subsidy programs on corporate decisions; and many other subjects.

- Stanford University's workshop deals with the microeconomics of inflation—the effect of inflation on a variety of markets. Under the impact of continuing inflation the meaning of terms like real income, real corporate profit, rate of return, and rate of interest becomes unclear and some new definitions may be needed. Moreover, most studies thus far have dealt with the responses of markets, institutions, and individuals to unexpected inflation; if inflation now is expected, as it appears to be, then some adjustments to it presumably have already been incorporated into business and financial practice, and it should be possible to observe some structural and behavioral changes in the economy. These are among the questions on which Stanford faculty and Ph.D. students will be working in the next two years.

- The University of Wisconsin-Madison has established two microeconomics workshops, one on the voluntary nonprofit sector and one on state-local fiscal relationships. Special seminars on the "third sector" have stimulated considerable research, and the acquisition of computerized data on

750,000 nonprofit organizations from the Internal Revenue Service will stimulate more. During the first three years Wisconsin students completed five Ph.D. theses on the voluntary sector and had seven more in progress. The other workshop has led to close involvement by faculty and students with key state officials. Evaluations were conducted of the financing of various joint state-local programs, and were made available to officials; more recently a detailed evaluation of the financing of public education has been undertaken. In addition, a large-scale study of the state's tax structure is being pursued, and a model is being designed to forecast the state's level of economic activity, tax receipts, and the like. Over all, the Wisconsin workshops assisted 25 graduate students in three years.

- Yale University's workshop takes as its theme the processes of innovation and adaptation in the economy. It treats changes in market structures and size of firms from an evolutionary, dynamic perspective, as responses to growth of demand, technological opportunities, and the relative ease of innovation in various industries. Particular attention is directed toward two industries in which technological innovations have appeared most difficult, railroads and housing. Numerous studies by Yale faculty and graduate students have examined the effects on the railroad industry of regulatory policies governing rates, consolidations and mergers, and abandonment of unprofitable operations. Another study deals with the disappointing performance of piggy-back operations. Studies of housing have examined the roles of local regulations and union practices in impeding the diffusion of innovations throughout the housebuilding market; one finding is that the backgrounds of local building officials greatly affect the adoption of innovations. Other papers have explored alternative housing subsidy policies, including direct subsidies to individual households. Yale foresees that much more fruitful work can be done on these and related topics over the next two years.

The preceding brief summaries make it appear that a substantial body of research on subjects directly relevant to current problems has been generated by the Sloan-supported workshops in microeconomics. Concerning the impact of the program on the profession, in shifting some attention of faculty and students to microeconomic questions, some numbers can be cited. The eight institutions reported that during the first three-year period, 226 graduate students in economics participated in their workshops; so did 44 students from other graduate departments, such as law, sociology, education, and business. The students had 130 theses in microeconomics completed or in preparation. From economics faculties, 49 members participated intensively in workshops, and 30 others participated from time to time; 43 members of faculties other than economics took part. Journal articles, books, and conference reports stimulated at least in part by the workshops appeared in gratifying numbers.

On the basis of these results, the Foundation's Trustees, as noted earlier, approved renewed support of \$140,000 over two years to each of the eight institutions. (New York University and Harvard University received three-year grants for analogous programs in 1977.)

Economic Research

- The rate of unemployment among teen-agers in the United States has averaged more than three times the adult rate over the past decade; in most other industrialized countries the two rates are nearly the same. Why this should be so is a major mystery. Some leading economists believe American young people simply disdain the kinds of jobs offered to them; others hold that teen-agers are eager to work but employers are not eager to have them at the wages which they must be paid.

The National Bureau of Economic Research is undertaking some fundamental research to try to understand the structure of youth unemployment and the reasons why the rate is so high. It will use some of the vast quantities of data collected by the Department of Labor and the Bureau of the Census in their monthly surveys of employment and unemployment; these government computer tapes contain information about the employment experience of a large number of young people, their education, family circumstances, and so on.

Professor Albert Rees of Princeton University, a leading labor economist, has taken leave from Princeton to join his own research on youth unemployment to that of the National Bureau. Using the same data tapes, Dr. Rees is conducting a cross-sectional study of the teen-age labor market to determine those factors which make it likely that a given teen-ager will be employed, unemployed, or out of the labor market. The variables to be considered are numerous: some of them are whether the young person is in or out of school, and living with one or both parents or on his own; income of the family, and the labor-force status and occupation of parents. Young adults aged 20 to 24 will be analyzed separately in an effort to determine why their unemployment rate is lower.

Thus if the factors that predispose youths to unemployment can be identified, some remedies might be devised. For support of Dr. Rees' contribution to this research the Foundation made a grant of \$100,000, covering a period of 15 months, to the National Bureau of Economic Research.

- Late in 1977 Harvard University Press published *The Visible Hand: The Managerial Revolution in American Business*, which promises to become a classic work of business history. Its author, Prof. Alfred D. Chandler, Jr., now Straus Professor of Business History in the Harvard Graduate School of Business Administration, received early Sloan support for his work on the book when he was at Johns Hopkins University. The book, which describes

the growing role of the class of professional managers in American capitalism since late in the 18th Century, received high critical praise in both popular and professional journals.

Professor Chandler and some scholars in Europe have acquired much of the data needed for a similar historical analysis of large-scale industrial enterprise, including American-based corporations, in Western Europe. Some work remains to be done for certain countries, and Dr. Chandler and associates at this writing are completing the research necessary for a book that will be the European counterpart of *The Visible Hand*, and that also will be a comparative study of managerial development in Europe and the United States. A 1978 Sloan grant of \$75,000 to Harvard University is partially supporting this work.

Management Education

- The government of New York City is acting to meet its need for more highly trained managers through the Top 40 Program of the Urban Academy for Management, Inc. Each year 40 City employees who have demonstrated a commitment to City service and a capacity to assume top management positions in City agencies are selected for advanced training in modern management methods. They attend classes one day a week while continuing to work at their jobs, and perform additional written assignments and special projects directly related to their work. The program extends over two years, including Summer and Winter recess periods.

The course content in the Top 40 Program is oriented to the specific needs of New York City government while drawing on the techniques and expertise of specialists, practitioners, and faculty from private industry and leading schools of management. The curriculum is built around several key themes: the ethical, economic, and bureaucratic constraints on management; the application of private-sector management techniques to City government; and the multi-functional perspective of executive management.

The Top 40 Program launched its first group of twenty executive trainees in January of 1978 and another twenty in October. Planning and start-up funds were provided by Sloan grants in 1976 and 1977. Given the program's promising early results and its relationship to the Foundation's interest in education for the public service, the Foundation agreed to provide support for an additional three years through a grant of \$300,000 to the CUNY Urban Academy for Management, Inc.

- The real world of business can look quite different from the inside, students in the Living MBA program at Babson College are discovering. In teams of four to six members, they are applying their classroom knowledge to specific management problems in cooperating businesses, municipal governments, and nonprofit agencies. The projects usually last one semester, and at



The Living MBA program of Babson College places students in consulting roles with business firms and public agencies. David Kaplan, the program's director, addresses a meeting of students, faculty, company representatives, and senior advisors to the program.

the end of that time the students are expected to be able to "sell" their recommendations to their host companies or agencies through written and oral presentations.

Babson, which offers both graduate and undergraduate degrees in business administration, felt that case studies and internships, while useful, were not fully adequate as a means of integrating students' technical knowledge with practical experience. Hence the Living MBA was developed and tested as an elective for students in the second year of study for the Master of Business Administration degree.

The student consultants are supervised by a faculty member (who thereby gains some real-world experience himself) and advised by a recently retired senior executive. This latter feature gives students, faculty members, and host companies the benefit of the executive's broad practical knowledge and ensures that his wisdom and experience will not be completely lost to society. Projects thus far have been in the Boston area, accessible from Babson's campus at Wellesley, Mass.

Babson has now formally adopted the Living MBA program and appointed as its director David Kaplan, previously an executive of Arthur D. Little, Inc. In the Fall of 1978 six projects involving 31 students were in progress. Host companies have rated the students' contributions highly and have offered jobs to some of them. The program is being partially supported for three years by a Sloan grant of \$189,000.

Economics for Journalists

• The explanation of complex and confusing economic events to the public is becoming a task for specialists. Some of those specialists are being trained at Princeton University's Woodrow Wilson School of Public and International Affairs through a Sloan-supported program now in its fourth year. Thus far 24 journalists have received advanced training in economics through the Alfred P. Sloan Foundation Fellowships in Economics Journalism, and eight more are presently enrolled. They have come from large and small newspapers, from wire services, and from television operations, in all parts of the United States; a few are from Canada. Employers pay part of the journalists' salaries while they are at Princeton.

The curriculum devised by Princeton for the Fellows requires a full academic year of study at the graduate level; most of them also take a preliminary Summer review course in mathematics. There is emphasis on the quantitative and theoretical aspects of economics and public policy; related courses in the Woodrow Wilson School are taken as electives. Guest speakers from Princeton and other universities, from government, and from journalism meet with the Fellows in a special workshop.

The Princeton program seems to have been a valuable experience for most of those who have attended it; it appears to be making a small but significant contribution to broader understanding of economic issues. The Foundation in 1978 made a grant to Princeton of \$280,000 for the fourth year of the program.

Other 1978 grants in the areas of economics and management:

Association for the Integration of Management, Inc., New York, N.Y.	\$20,000
For support of the Association's operations in behalf of minorities in management.	
California State University, Northridge	\$19,150
For design and testing of a special curriculum to educate engineers in entrepreneurship.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$7,500
For research by Prof. William Letwin on the history of American economic policy.	
Roosevelt University, Chicago, Ill.	\$19,800
For a study to determine the extent of demand for higher education among minorities holding full-time jobs in the Chicago area.	
Yale University, New Haven, Conn.	\$20,000
For a summer program in economics for minority students.	

Science and Technology

The health of the nation's basic research enterprise continued to be a matter of concern in 1978. Analyses of federal basic research funding for fiscal 1979 have shown little or no growth over 1978 above the rate of inflation, except for basic biomedical research. The apparent mood of taxpayers and conflicting economic predictions added to the uncertainty of prospects for the future.

The growing complexities of the mechanisms of government research support, and their effects on the productivity of university-based research, were widely discussed in 1978 and are among the concerns of the Sloan Commission on Government and Higher Education (see Page 41). Another worry which came to the fore was the apparent lag in the development of scientific discoveries into useful new technologies. The need for more, and more highly qualified, engineers continues; at present the Sloan Foundation concentrates on expanding the number of minority engineers (see Page 48).

For the most part, the Foundation through its grants for science and technology in 1978 sought to advance research and the training of tomorrow's researchers in certain disciplines, principally the physical sciences, mathematics, and neuroscience. The Particular Program in the burgeoning new field of cognitive science gained momentum (see Page 55), and a number of broader educational efforts involving science and technology were launched.

Research and Education

- The Foundation's premier activity in support of science continues to

be the Sloan Fellowships for Basic Research, which since 1955 have assisted 1,485 young scientists at 155 institutions with an aggregate outlay of about \$29.6 million. During 1978 two-year fellowships having a value of \$19,800 each were awarded to 79 scientists in 46 colleges and universities in the United States and Canada. The 1978 fellowships came to a total of \$1,564,200.

During the year under review officers of the Foundation solicited the views of some 60 eminent scientists about the value of the Foundation's past and present efforts in advancing science, and about future directions those efforts might take. Those consulted were virtually unanimous in stating that assistance through the Sloan Fellowships to outstanding young scientists just beginning their independent research careers was the best possible use of the funds available for that purpose. The only significant suggestion for change was that the amount of the awards be increased, lest their value be seriously undermined by inflation.

Evidence that the Fellowship program is having success in identifying young scientists of unusual potential came with the award in 1978 of the Fields Medals, which are the highest honor available to a mathematician and are regarded as comparable in some respects to the Nobel Prize. Recipients of the quadrennial awards were two Americans, a Russian, and a Frenchman. The Americans, Daniel Quillan of Massachusetts Institute of Technology and Charles Fefferman of Princeton University, both are former Sloan Research Fellows.

The Foundation awards Sloan Fellowships on the basis of nominations received from department heads, former Sloan Fellows, and other scientists in a position to identify young people of exceedingly high promise. Nominees usually are in their first faculty appointments in departments of chemistry, physics, and mathematics; in neuroscience they may also be postdoctoral fellows. The Foundation solicits letters of comment on each nomination, and the final decisions are made by a committee composed of two senior scientists from each of the four disciplines covered by the program.

The Sloan Fellowships are designed to allow added freedom and flexibility in the conduct of the recipients' research. The awards may be used for any reasonable purpose associated with the research activities of the Fellow: for technical assistance, professional travel, summer support, computer time, support of graduate students, release from teaching, and to a limited degree for equipment.

The Foundation does not require a research proposal of the Fellow; it is concerned not about the precise subject of the research but about the Fellow's professional growth and development. Published reports of work aided by the award may serve as annual progress reports.

The committee of scientists who reviewed the nominations for the 1978 Fellowships consisted of:

Dr. T. D. Lee, Professor of Physics,
Columbia University, Chairman.

Dr. S. S. Chern,
Professor of Mathematics,
University of California, Berkeley.

Dr. William M. Fairbank,
Professor of Physics,
Stanford University.

Dr. Seymour S. Kety,
Professor of Psychiatry,
Harvard Medical School.

Dr. Jurgen Moser,
Professor of Mathematics,
New York University.

Dr. Eliot Stellar, Provost,
University of Pennsylvania,
a neuroscientist.

Dr. Gilbert Stork,
Professor of Chemistry,
Columbia University.

Dr. John S. Waugh,
Professor of Chemistry,
Massachusetts Institute of Technology.

Scientists who received Sloan Fellowships in 1978 are the following, listed by institutions and fields of science:

Barnard College
Chemistry: Sally Chapman

Brandeis University
Neuroscience: Lee Makowski
Physics: Karl F. Canter

University of British Columbia
Physics: William G. Unruh

Brown University
Chemistry: David E. Cane

California Institute of Technology
Chemistry: Ahmed H. Zewail
Mathematics: Alexander S. Kechris
Neuroscience: David C. Van Essen
Physics: Paul M. Bellan, Jason B. Saleeby

University of California, Berkeley
Chemistry: John S. Winn
Mathematics: Ole Hansen Hald,
Andreu Mas-Colell
Neuroscience: Richard C. Van Sluyters

University of California, Davis
Physics: Robert N. Cahn

University of California, Irvine
Neuroscience: Theodore W. Berger

University of California, Los Angeles
Physics: Gary A. Williams

University of California, Riverside
Chemistry: M. Mark Midland

University of California, San Diego
Mathematics: Thomas J. Enright
Neuroscience: Ian N. R. Creese

University of California, San Francisco
Chemistry: Paul R. Ortiz de Montellano

University of California, Santa Barbara
Chemistry: Horia I. Metiu, Daniel L. Purich
Physics: John L. Cardy

University of Chicago
Physics: Robert C. Aller, Melvyn J. Shochet

Clemson University
Chemistry: H. Keith McDowell

Colorado State University
Physics: George C. Collins

Columbia University
Chemistry: W. Clark Still
Physics: Erick J. Weinberg

Cornell University
Chemistry: Bruce Ganem
Mathematics: Robert G. Bland

Duke University Medical Center
Neuroscience: Raymond J. Dingledine, Jr.

University of Florida
Physics: Gary G. Ihas

University of Guelph
Physics: Bernie G. Nickel

Harvard Medical School
Neuroscience: Larry I. Benowitz,
Victoria Chan-Palay

Harvard University
Physics: Estia J. Eichten

University of Illinois
Chemistry: Robert B. Gennis, Eric Oldfield,
John R. Shapley

Indiana University
Mathematics: Charles M. Newman

Indiana University School of Medicine
Neuroscience: David L. Felten

Johns Hopkins University
Mathematics: Harold Donnelly

University of Kentucky
Mathematics: Steven C. Ferry

McMaster University
Physics: Peter G. Sutherland

University of Michigan
Mathematics: Daniel M. Burns, Jr.

Northwestern University
Chemistry: Eric Weitz

Pennsylvania State University
Chemistry: Gregory L. Geoffroy
Mathematics: David A. Sibley
Physics: Julian D. Maynard

University of Pennsylvania
Neuroscience: Richard R. Miselis
Physics: Torgny Gustafsson,
Hugh H. Williams

University of Pittsburgh
Chemistry: Alan P. Kozlowski

Princeton University
Mathematics: John E. Fornæss,
Warren M. Sinnott
Neuroscience: Michael E. Trulson

Rice University
Chemistry: Richard E. Smalley

Rockefeller University
Neuroscience: Lewis C. Krey

University of Southern California
Chemistry: Arieh Warshel

Stanford University
Mathematics: Robert A. Oliver
Physics: Stuart J. Freedman, Alan M. Litke

Stanford University School of Medicine
Neuroscience: King-Wai Yau

Syracuse University
Chemistry: Laurence A. Nafie

University of Texas, Austin
Physics: Edward L. Robinson

University of Toronto
Chemistry: Stephen C. Wallace

Tulane University
Mathematics: J. Thomas Beale

Washington University School of Medicine
Neuroscience: Bruce K. Krueger,
Larry W. Swanson

University of Washington
Chemistry: Josephus G. Norman, Jr.

Wayne State University
Mathematics: Clarence W. Wilkerson, Jr.
Physics: Lowell E. Wenger

Wayne State University School of Medicine
Chemistry: Gregory A. Petsko

University of Wisconsin
Mathematics: Ronald J. DiPerna
Neuroscience: Dean O. Smith

Yale University
Physics: Peter M. Koch,
Augustus Oemler, Jr.



The Department of Computer Science at the University of Rochester has developed rapidly since it was established in 1974. Prof. Jerome A. Feldman, department chairman, advises a graduate student in the use of the department's minicomputer network.

- The computer in a modern university is both a tool for facilitating research in many disciplines and the subject of a discipline of its own, computer science, which seeks to understand the full potentialities of the machine and to investigate matters like artificial intelligence. The University of Rochester in 1974 established an inter-college Department of Computer Science to expand the benefits of computing on its campus. The new Department, headed by Prof. Jerome A. Feldman, developed rapidly and by 1978 had a faculty of eleven, many of them holding joint appointments with other departments. Faculty members are teaching a variety of beginning and advanced courses, and are contributing significantly to the research literature of computer science. In 1977 the Department was authorized to award the Ph.D. degree.

Seeking to build a fully rounded research effort, the Department in 1978 still needed faculty members in certain specialties and a means of supporting them until they could become established in their research. The Sloan Foundation, which had contributed some initial impetus with an earlier grant of \$400,000, agreed to provide an additional \$150,000 over three years. This will partially support two new joint appointments, one in mathematics and computer science and the other in psychology and computer science.

- The discipline of neuroscience, the study of the brain and its relation-

ship to behavior, has grown swiftly in the past decade, stimulated in part by the Sloan Foundation's Particular Program in Neuroscience, which was terminated at the end of 1976. The discipline is so broad, embracing so many types and techniques of research, that its leaders have been obliged to recognize that no single university can offer training across the entire spectrum of neuroscience. This is especially true in the present era of financial constraints on universities.

The West Coast Regional Consortium of Universities in the Neurosciences represents one kind of effort to overcome such limitations. Twelve universities from Seattle to San Diego have created a mechanism for sharing facilities, faculties, and students; they intend by this means to assure that their training resources will be more fully utilized and that the best educational opportunities in the region will be available to all their pre- and postdoctoral students. Since "no university can have everything," as the Consortium recognizes, students from other institutions may travel to the University of Washington to work with its primate colony, for example, or to a specialized laboratory at the University of California at Los Angeles to learn electron spin resonance techniques for the study of membranes.

The Consortium also will encourage travel by faculty members to give special lectures and mini-courses, will maintain a directory of available programs, and will stimulate other cooperative activities among the twelve institutions.* To assist the Consortium over its first two years, the Foundation made a grant of \$100,000 to the University of California at Los Angeles, its present headquarters.

- Rapidly expanding knowledge in the biomedical sciences poses a constant challenge to medical schools which must instill in their students a secure grasp of basic biological sciences in a relatively short time. Meharry Medical College, which educates more black physicians than any other school, faces this problem in acute form: in the drive to train more minority doctors over the past decade, its enrollment in M.D. and other programs more than doubled, to over 1,000. At the same time, its basic science faculty grew by only about 30 per cent. Thus its student-faculty ratio has become higher than is desirable.

A 1970 grant of \$1 million helped Meharry to reach its present level. Although the Particular Program through which that grant was made is no longer active, some further assistance seemed warranted. Meharry is planning to add one faculty member in each of five areas: anatomy, biochemistry,

* Consortium members are California Institute of Technology; University of Oregon, Portland and Eugene; University of Southern California; Stanford University; University of Washington, Seattle; and the University of California at Berkeley, Davis, Irvine, Los Angeles, San Diego, and San Francisco.

microbiology, pharmacology, and physiology. A new five-year grant of \$300,000 will help to support them.

Meharry also hopes to improve instructional efficiency through increased use of educational technology and self-paced instruction. Another 1978 grant, of \$20,000, is supporting a planning-and-development project designed to exploit a closed-circuit television system now installed in the institution's new basic sciences building and to explore other instructional technologies.

- The Foundation in 1978 continued its annual contribution to the operating expenses of the Sloan-Kettering Institute for Cancer Research, a practice which dates back to the founding of the Institute in 1945. For 1978 the total contribution was \$600,000, which included \$400,000 previously committed. This represented about 15 per cent of the Institute's income from private sources, and helped to sustain some research projects affected by a leveling off in support from the National Cancer Institute, which provides nearly three-fourths of the Institute's operating funds.

Applied Mathematics

- The wedding of mathematics to other disciplines appears to be a means of insuring that it will be of more than theoretical interest, and also that its practitioners will find useful employment. The SIAM Institute for Mathematics and Society, an offshoot of the Society for Industrial and Applied Mathematics, has been "transplanting" Ph.D. mathematicians into societal fields such as population growth, environmental health, energy, and cultural evolution, with help from the Sloan Foundation and others. This program is demonstrating that mathematics can make important contributions to the solution of some societal problems, and that mathematicians can carve out careers in significant fields other than mathematics itself.

The SIAM Institute, known as SIMS, now is inaugurating an analogous program for graduate students working toward the doctorate. In its pilot phase the graduate program is being conducted at two centers having previous experience with "transplants," the Harvard Center for Population Studies and the Energy Laboratory at Massachusetts Institute of Technology. Both fields are highly interdisciplinary, and SIMS feels that both offer challenging problems in which mathematics can be an integral and effective partner, particularly if it is involved on a continuing and in-depth basis. SIMS expects to expand the program eventually to other fields and other institutions. The pilot phase, involving two students at Harvard and two at M.I.T., is being assisted by a three-year Sloan grant of \$87,000 to SIMS.

- Hunter College of the City University of New York has developed a master's degree program in applied mathematics which is so successful that employers are waiting in line to hire its graduates. Industry, city government,



Wellesley College students learn academic uses of computers in the College's new science center. Sloan is supporting workshops for faculty who want to use computers in teaching.

and non-profit institutions alike are eager to employ persons trained to apply mathematical techniques to practical problems. Hunter feels that it also could do much more at the undergraduate level by introducing more modern courses in applied mathematics, and in particular strengthening its links with computer science. It needs to assess the personnel requirements of the major employers in the New York area, to analyze the kinds of students it is attracting and might attract, and to design a program and courses which would best serve all concerned. For this planning effort by Hunter faculty members the Foundation made a grant of \$38,000, paid to Research Foundation of the City University of New York.

Computer Literacy

The growing pervasiveness of computer technology in nearly all aspects of contemporary life makes it likely that some familiarity with computers soon will be a necessity for success in many professions. What is called computer literacy—the ability to perform at least some relatively simple operations at a terminal—is receiving increasing attention from educators. The continuing decline in the cost of computers makes them available to a broader range of institutions, particularly liberal arts colleges, and many of them are acutely

aware of the need to integrate computers into their instructional programs. How to do this effectively is the question, and there is of course no single answer that applies to all. During 1978 the Foundation gave support on an experimental basis to several modest approaches to computer literacy; whether this will become the subject of a full-scale Foundation program remained undecided at the year's end.

- Wellesley College is in the first stage of an institution-wide program in computer literacy. It has obtained and installed excellent computing facilities, with a generous number of remote terminals, in its new science building. As a women's college, however, with a traditional emphasis on the humanities, it has few faculty members who are able to use this powerful new technology. A survey found that many of them were eager to learn, and thus the College has scheduled a series of six-week Summer workshops at which teachers in the natural and social sciences and the humanities will be introduced to academic computing. If the plan succeeds, after three years some fifty faculty members will be able, to some extent, to write their own programs and to make regular use of the Wellesley computer system for their own courses and research.

Primarily for support of the workshop participants, and for the time they will spend during the academic year developing course materials, the Foundation made a three-year grant of \$250,000.

- Case Western Reserve University recently reviewed its computing needs and decided to build an entirely new system based on a distributed minicomputer network with initially 100 and ultimately 200 terminals throughout the campus. When completed the system will be one of the few that provide universal access to interactive computing on a charge-free basis to students and faculty members.

Two new software programs must be developed from scratch to exploit the full potential of the Case Western Reserve system. The first, an "interface package," is an interactive tutoring program that will introduce students and faculty members to the new network, and instruct them as to its capacities and how to make the most efficient use of the system; it will also be a guide for the user who is new to any kind of computing, and will conduct him through the procedures appropriate to whatever research or instructional program he wishes to use. In the second project all terminals will be linked to the University's libraries so that students and faculty members can search the libraries' holdings, reserve books and other publications, and perform other tasks from remote locations. Ultimately all terminals will be connected to the Ohio College Library Center, a national computer-based consortium of college libraries; the Case system will make possible search and inter-library loans directly by students and faculty members.

For development of the two software projects the Foundation made a

three-year grant of \$112,000 to Case Western Reserve. (The Foundation does not make grants for computer hardware.)

Three smaller grants were made for projects in computer literacy in 1978:

- Five Colleges, Inc., a consortium in central Massachusetts, received \$20,000 for a study intended to produce a plan for an academic computing system to serve all five of its members—Amherst College, Hampshire College, Mount Holyoke College, Smith College, and the University of Massachusetts.

- Simmons College, a women's college in Boston, received \$18,000 for an experiment in which students already skilled in computing will be trained to instruct others and will be available either at terminals or over a telephone "hot line" to render assistance.

- Sweet Briar College received \$16,000 to help convert computerized instructional materials, particularly in mathematics, for use on a new and larger computer which it shares with two other colleges.

Science Information

The unrestricted circulation of scientific information is vital to the continuing progress of science; it is also a necessity for many administrators and decision makers; and it is certainly desirable for the citizens and taxpayers who ultimately pay for most scientific research. In any given year a number of Sloan grants are made for the purpose of facilitating the flow of scientific communication; in 1978 there were three of these, and one internal appropriation, for activities of somewhat broader than usual interest.

- As the products of science and technology have come to dominate the human environment, one result has been a growing body of laws and regulations intended to protect human health against possible unforeseen hazards. The need for solid scientific evidence in the formulation of such rules is increasing, but the procedures for assembling the knowledge needed for wise and just decisions have not kept pace. In consequence, rational discussion based on fact often is overwhelmed by emotional appeals. Matters such as the safety of saccharin, automobile emission standards, and "gene-splicing" research become matters of heated controversy.

Cold Spring Harbor Laboratory, an eminent center of biological research, proposes to strengthen the scientific basis of such discussions through a program of biological risk assessment. Four to six times a year it will bring together twenty to thirty experts on a particular substance (such as hair dyes, food preservatives, chlorinated pesticides, and the like) with the aim of arriving at quantitative appraisals of the possible risks they entail for the human population. Where there is no consensus, the major viewpoints will be pre-

sented; where there is a lack of crucial data, that will be pointed out. The program intends to publish its assessments fairly rapidly and to distribute them to responsible governmental, industrial, and consumer groups. A noted science journalist, Victor K. McElheny, has been appointed to direct the program, with an advisory council of distinguished scientists.

In other meetings, the Cold Spring Harbor program will seek to bring its findings to the personal attention of key officials in affected industries, federal agencies and Congressional staffs, and consumer and labor groups. The aim will be to strengthen the factual knowledge of such individuals rather than to press particular recommendations. Separate meetings will attempt to do the same for representatives of the news media.

A number of leaders in science, and some in government, believe that a new forum like the one at Cold Spring Harbor will attract the most highly qualified scientists and will enable them to make real progress on difficult issues in a non-adversary setting. In partial support of the program the Foundation made a two-year grant of \$100,000.

- The University of Chicago is experiencing an increasing demand for information about a remarkable new research instrument which has been developed there over the past decade, the high-resolution scanning electron microscope. Dr. Albert V. Crewe and his associates in the University's Department of Physics and the Enrico Fermi Institute have succeeded in combining the best features of the earlier transmission electron microscopes with those of the newer scanning instruments to achieve a magnification of 10 million times—high enough to photograph individual atoms of uranium in motion. Dr. Crewe believes that, with still more advanced techniques, it may be possible to read out visually the four chemical bases that serve as "letters" in the DNA code. A Sloan grant of \$429,000 in 1971 assisted in the development of the instrument.

With the popular press and scientific groups alike showing keen interest in the new high-resolution microscope, the University of Chicago decided to make a film portraying the instrument's capabilities, the theoretical concepts on which it is based, and some of the technical problems that had to be solved, including the design of an extremely powerful electron source and the creation of an extraordinarily high vacuum. It is hoped that the proposed film will answer many of the questions being asked by scientists about the instrument, while at the same time offering to lay audiences some deeper insights into the conduct of scientific research. The Foundation in 1978 made a grant of \$60,000 to the University of Chicago for preparation of this film.

- As the 100th anniversary of Albert Einstein's birth in 1879 approaches, numerous institutions and organizations are laying plans to commemorate the event in various ways. Princeton University Press is undertaking the monumental work of organizing, editing, and publishing Einstein's

complete writings. The task involves some 50,000 documents, which may run to twenty volumes or more. The preliminary work includes constructing a duplicate Einstein Archive, so that the original documents may be spared unnecessary handling; developing, on a computer, a control index for the entire collection; compiling a bibliography of books and articles about Einstein and his scientific, historical, and cultural milieu; and obtaining many of those items for an editorial reference library. In addition the Princeton Press is endeavoring to locate all living correspondents of Einstein in order to solicit comments on their correspondence and other contacts with him.

As editor of the Einstein series the Princeton Press has engaged Dr. John Stachel, professor of physics and director of the Institute for Relativity Studies at Boston University. Miss Helen Dukas, Einstein's secretary from 1928 until his death in 1955, has served as archivist of the Einstein papers since then and is cooperating with the Princeton project. Additional staff and an editorial committee will be appointed as the work progresses. The actual editorial work is expected to begin about the middle of 1979, subject to approval by the Einstein Estate which controls the documents. The Sloan Foundation authorized a two-year grant to Princeton University Press of \$150,000, of which \$100,000 is contingent on continuation of the project into the second year after mid-1979.

The Foundation's Book Program, first mentioned in the Report for 1976, by 1978 had brought two full-length manuscripts near to completion; seven other prospective authors were at either the discussion or the writing stage. Harper & Row has agreed to be the publisher for the series.

The Book Program was conceived as a means of conveying to a wide general audience the cultural and humanistic aspects of research in the sciences and other disciplines. Invitations to consider writing books have been extended to about a dozen natural and social scientists who have distinguished themselves by outstanding achievements in their fields. Each of these scholars, some of them Nobel laureates, has been asked by the Foundation to reflect at length upon his or her career and field of scholarship and to write an account which places that work in a social, cultural, and historical perspective. The books will begin to appear in the early Fall of 1979.

Authors of the first two books scheduled for publication by Harper & Row are Dr. Freeman Dyson, a mathematical physicist and theoretical astronomer at the Institute for Advanced Study in Princeton, N.J., and Sir Peter Medawar, a Nobel laureate in biology and director of the Clinical Research Centre in Harrow, England. The Sloan Foundation is prepared to underwrite at least fifteen books in the series; a further appropriation of \$300,000 for this purpose was approved in 1978.

An advisory committee of distinguished scholars, chaired by Dr. Robert

L. Sinsheimer, chancellor of the University of California at Santa Cruz, is overseeing the Book Program. Other committee members are Dr. Howard Hiatt, dean of the Harvard School of Public Health; Dr. Mark Kac, professor of mathematics at Rockefeller University; Dr. Daniel McFadden, professor of economics at M.I.T.; Dr. Robert Merton, professor of sociology at Columbia University; Dr. George Miller, professor of experimental psychology at Rockefeller University; Dr. Philip Morrison, professor of physics at M.I.T.; Winthrop Knowlton, president of Harper & Row; and Simon Michael Bessie, senior vice president of Harper & Row.

Technology Assessment

Appraising the impact of a new technology on human society is a difficult, laborious, and, as noted earlier, potentially controversial undertaking. Yet from time to time certain technologies emerge as such powerful influences that the attempt must be made to determine exactly what it is that they are doing to us. One such technology is television, some aspects of which were studied at length by the Sloan Commission on Cable Communications. That Commission's report, made public late in 1971, dealt with the ramifications of a technology which only now seems to be coming into its own.

Television in general has fomented more discussion and controversy than most new technologies of the last three or four decades. It is charged with, among other things, impairing the reading and writing skills of today's children and young adults. This charge was frequently heard as the Sloan Foundation's staff attempted to formulate a program to improve the teaching of writing in schools and colleges (see Page 45). More time spent with television means less time spent with books and other reading matter, the argument went.

That statement began to seem overly simple as the Foundation staff looked further into the matter. Near the close of 1978, a report to the Trustees said in part: "It became clear that what was at issue was not a question of competition with television for leisure but the total social impact of television. The acculturation of the young which had once taken place directly within the family and indirectly through juvenile reading matter had been affected by the impact of television on family life and by the replacement of the juvenile book by the juvenile television program. It was at least possible that large numbers of children were losing the will to read and write, and that the capacity to read and write was suffering as a consequence. It was possible also that the emergence of a primarily audio-visual communications system could lead to a significantly different outlook upon life and upon one's own culture that was in a limited sense independent of the substance of the communications themselves."

Beyond such considerations were the obvious changes which television had wrought in politics and government, in international affairs, in the role of parents, in education, in journalism and advertising, and in a host of other areas of life.

At a week-long seminar in June of 1979 a group of persons knowledgeable in television, sociology, psychology, anthropology, and other fields will endeavor to determine just what is known and unknown, and what needs to be known, about the impact of television on society. The outcome cannot be predicted, but previous seminars of this kind have been helpful to the Foundation's programs in minority engineering education and in education for the public service.

Cochairmen of the seminar on the social impact of television will be Dr. Jerome Bruner, a psychologist, of Oxford University, and Dr. Ithiel de Sola Pool of Massachusetts Institute of Technology, a political scientist with a long-standing interest in communications technologies. An appropriation of \$75,000 will support the seminar and preparations for it.

These other grants were made in 1978 for research and education in science and technology:

American Mathematical Society, Providence, R.I.	\$3,300
In support of a special session on mathematical biology at the Society's annual meeting.	
Bowling Green State University, Bowling Green, Ohio	\$20,000
For a national study of changing needs in undergraduate education in chemistry.	
University of Connecticut Foundation, Storrs, Conn.	\$13,300
To provide research support for a survey of academic attitudes toward the support of science, to be conducted by S. Martin Lipset and Everett C. Ladd.	
Council on Science and Technology for Development, Washington, D.C.	\$20,000
For an analysis of studies of science and technology in the development process.	
Foundation for Research into the Origin of Man, Far Hills, N.J.	\$20,000
To assist in the establishment of a scientific advisory council and a structure for obtaining sustained support for scientific participation in the work of The International Louis Leakey Memorial Institute for African Prehistory.	
Hall of Science of the City of New York, Flushing, N.Y.	\$15,000
In partial support of development and refurbishing of exhibits.	
Harvard University, Cambridge, Mass.	\$20,000
In support of the Office of Health Policy Information of the Harvard School of Public Health.	
Institute for Advanced Study, Princeton, N.J.	\$20,000
For partial support of a symposium to be conducted by the Institute as part of its Einstein Centennial Celebration.	
Massachusetts Institute of Technology, Cambridge, Mass.	\$10,000
For a symposium on "The Use of Scientific Evidence and Testimony in Formal Proceedings."	

In support of a study of multinational arrangements for the nuclear fuel cycle.	\$20,000
For a preliminary study by the M.I.T. Energy Laboratory of the technological, political, economic, and environmental aspects of the use of oil shales as a fuel source.	\$20,000
National Academy of Sciences, Washington, D.C.	\$15,000
For a study by the National Academy of Engineering of the social, educational, and governmental issues associated with computer technology.	
Rockefeller University, New York, N.Y.	\$13,000
In partial support for one year of the work of Dr. June Goodfield in public understanding of science.	
For preparation of a biography of the Russian neuroscientist Alexander R. Luria.	\$18,000
Society for Neuroscience, Bethesda, Md.	\$10,000
For a conference on future needs of neuroscience.	
University of Southern California, Los Angeles, Cal.	\$20,000
For a needs assessment and feasibility study concerned with science education at the junior high school level.	
Wesleyan University, Middletown, Conn.	\$10,000
In support of the University's Math Clinic.	

Sloan Commission on Government and Higher Education

The Sloan Commission on Government and Higher Education was established by the Foundation in 1977 to examine the increasingly complex relationships which have arisen between academic institutions and government, and to propose ways of reducing the resulting tensions. The Commission's membership and the rationale for its creation were presented in the Report for 1977. Its Chairman is Louis W. Cabot, chairman of the board of the Cabot Corporation in Boston. Its Vice Chairman and Director of Research, Professor Carl Kaysen of Massachusetts Institute of Technology, prepared the following report on its activities during 1978:

During 1978 the Commission completed two-thirds of its planned life of one and a half years. It held seven meetings one and a half or two days in length. The first four served as general discussion sessions, in which the staff presented the Commission with surveys of the major aspects of government-higher education relations. On the basis of these surveys, the Commission then identified the major substantive policy areas that it proposed to discuss and proceeded to take them up serially. By the last two meetings of the year the Commission had begun to consider preliminary drafts concerning these same issues.

The President's Statement in last year's report identified five major themes that the Commission felt it should address. They were: the rationale for federal involvement in higher education; the transition from elite to mass higher education; the government's influence on the tension between uniformity and diversity; the special problems posed for the government by the growth of excess capacity, which it had helped to create; and, finally, the combined effect of rapid growth of regulation and massive federal patronage on the autonomy of higher education and its ultimate capacity to sustain its

role as a source of independent critical thought on social, political, aesthetic, and moral issues.

Rather than address these themes as such directly, the Commission has decided to trace them through an examination of the major substantive areas of government impact on higher education. These are five in number: financial aid to students in colleges and universities; federal support of basic research; direct federal regulation of the activities of colleges and universities, with particular emphasis on the regulations which impinge on the central academic functions of selection of students and faculty, and determination of curriculum; the regulation and financing of medical education, and its interrelation with the financing and the regulation of the provision of health care; and the result of all these changes as well as the changing economic and demographic context on the governance of higher education.

In addition to these major substantive areas, the Commission expects to give some attention to a number of narrower problems of federal policy, including the organization of federal activities in the sphere of higher education and federal assistance for developing institutions.

The staff director and his five professional colleagues have been working full-time in the preparation of drafts for Commission discussion. Many of these drafts have circulated informally within the higher education community. In addition to the in-house work of the staff, a number of special studies by outsiders have been commissioned. These include a detailed examination of the probable consequences of regulations designed to insure "equal access" to colleges and universities by handicapped persons; a study of the special problems that church-related colleges and universities experience in complying with government regulations; and studies of higher education in ten states. These state studies focus on two questions: the first is the character of the states' student aid programs, and the extent of their coordination with federal programs; the second is the degree to which the end of expansion and the prospective decline in the numbers of students seeking higher education have brought about changes in the governance of public institutions, especially in the relations between governors and their staffs, and legislative bodies and their staffs, on one side, and institutions' Boards of Regents and chief academic officers on the other. The ten sample states are: California, Florida, Louisiana, Massachusetts, Nebraska, New York, Ohio, Texas, Washington, and Wisconsin.

The Commission has held first-round discussions of draft chapters on two of the major substantive topics, student aid and research support, as well as on developing institutions. The other three major topics will be covered in three meetings early in 1979. Thus the basis for a first draft of the Commission's report will be laid before mid-year, with the finished product expected by the year's end.

Other General Program Grants

Related to the foregoing General Program interests but not falling clearly into those distinct categories were three major grants and a number of smaller ones awarded in 1978. Most had some form of education as their purpose, and a few were designated as civic grants, for the benefit of the greater New York community of which the Foundation is a part.

Information Resources

- The plight of the nation's research libraries is by now a familiar one: their costs of operation have been increasing for many years faster than the general rate of inflation and have now reached a rate that cannot be sustained indefinitely even at the best-endowed institutions. Thus their future ability to meet the needs of scholars and students is threatened. For more than two years an informal committee of officers of nine large private foundations, the National Endowment for the Humanities, the Library of Congress, the Council on Library Resources, and a number of universities has been discussing what might be done about the problem and which agencies might appropriately take action against it.

Plans for a number of nationalized services to ease the burden on research libraries have evolved from the work of the informal library committee. First priority was assigned to the creation of a national bibliographic network—a centralized computer-based system for automating some routine operations involved in acquiring books and periodicals, cataloging them, and getting them on the shelves. Performing these operations manually now often costs more than the item itself, \$25 or more in some libraries. Many of these functions can now be automated, but if each library had to develop and install its own system the over-all cost would be prohibitive. What is needed is a

national computerized system connecting the regional library networks that now exist, each of which in turn would connect the individual libraries of its region, providing them with standardized bibliographic services.

Construction of the first stage of a computerized national bibliographic network is now beginning under the auspices of the Council on Library Resources. The work will take five years and cost an estimated \$6.1 million. The Library of Congress, the principal source of cataloging data for other libraries, will be the central point of the proposed network. At present the Library of Congress converts the data on all its new acquisitions in English, some 200,000 a year, into machine-readable form and distributes them to libraries around the world having the appropriate equipment for reading them; it expects to incorporate acquisitions in essentially all languages into this system within five years. In time, if Congress and other sources provide the money to expand the Library's computer facilities sufficiently, other libraries could have direct access to this information in the Library's data bank, thereby saving much of the cost of cataloging and processing new titles.

But for the first stage of the national network, the more modest step of linking the Library of Congress to eight of the existing regional library systems is being undertaken. This in itself is a formidable organizational and technical task which may require new technological inventions. The Council on Library Resources has established a special management committee with representation from all interested organizations to establish schedules and monitor progress in the many complex operations involved.

Support for the first phase of the national bibliographic network is being provided by several major private foundations and the National Endowment for the Humanities. The Sloan Foundation made a five-year grant of \$600,000 to the Council on Library Resources.

- The principal source of factual information about philanthropic foundations is the Foundation Center, established in 1956. The Center estimates that 50,000 persons a year make use of the free services at its libraries in New York and Washington and at affiliated regional collections in all 50 states, Mexico, and Puerto Rico. During 1978 it established new field offices to provide expanded information services in the San Francisco and Cleveland areas. The Washington library answers numerous requests for information from government officials.

The Foundation Center's primary "customers" are persons and organizations seeking to identify foundations to which they might apply for grants. Besides providing the free library services, the Center publishes a variety of foundation directories and guides to the field, and maintains computerized data bases which can produce information about foundations interested in a particular field or located in a particular area, for example. These income-producing activities have reduced, but not eliminated, the Center's reliance

on foundations for operating support. The Sloan Foundation in 1978 renewed its support of the Foundation Center with a three-year grant of \$120,000.

Expository Writing

The Foundation continued in 1978 its exploration, noted in the Report for 1977, of a possible program to upgrade student writing skills. For all the attention that the writing problem continued to receive, there still remained a scarcity of genuinely new ideas about how to cope with it. To the Foundation it began to appear that nothing less than an entirely new 12-year writing curriculum, based on new knowledge of the cognitive processes involved in student writing, was required. One substantial grant was made to stimulate work in that direction.

- The psychology of language is a recognized academic specialty, reflecting the interest of cognitive psychologists in the ways human beings learn to read and speak a language. Until recently this interest has not extended to writing. The production of language on paper—the mental processes through which students go at various ages and grades to express their thoughts in written form—is not a well-developed field of knowledge. In the last few years, however, the psychology of writing has become the dominant professional interest of a few cognitive psychologists who are working with experienced curriculum developers and teachers in schools to begin to establish a cognitively based pedagogy of writing.

A group at the Ontario Institute for Studies in Education, a graduate division of the University of Toronto, is bringing to bear insights from cognitive psychology, psycholinguistics, artificial intelligence, and other relatively new disciplines on the problems of teaching writing to schoolchildren. The group is headed by Dr. Carl Bereiter, an American cognitive psychologist who has previously developed curricula in reading and mathematics for public schools.

The Bereiter group enjoys close relationships with certain public schools in which it tests many cognitive theories about writing. Students are given writing tasks having various underlying purposes; one purpose is to make them aware of the various levels of cognitive processing they use in writing, so that they can begin to exert conscious control over them. "Consequential" tasks motivate students to develop strategies for making their writing communicate information accurately to fellow students. Dr. Bereiter hopes to develop a rhetoric of ordinary "bad" writing so that children can be led to understand what they are doing, and to recognize its limitations. Also, he plans to investigate ways of improving writing fluency in primary-grade children in order that early negative attitudes toward writing can be forestalled.

This is only a small part of the work that needs to be done if a full 12-year writing curriculum is to be developed. But it appears to be essential to

the larger project, should that ever come to pass, and may constitute a valuable contribution in its own right to improved teaching of writing skills. The Bereiter group is expanding and accelerating its research and development work with the aid of a two-year Sloan grant of \$200,000 to the Ontario Institute for Studies in Education.

- Writing specialists at three universities are exploring cooperatively the use of a computerized text editor, now widely used in publishing, as an instrument for teaching expository writing. A two-year grant of \$20,000 to Massachusetts Institute of Technology is supporting this experiment. The other universities are Harvard University and Cornell University.

The Foundation made these other grants for educational and civic purposes in 1978:

Barnard College, New York, N.Y.	\$20,000
In partial support of a review of the relationship between Barnard College and Columbia University.	
Buena Vista College, Storm Lake, Iowa	\$17,000
In partial support of a long-range planning study of the College's applicant pool, its expected revenues, and related matters.	
Citizens' Scholarship Foundation of America, Inc., Concord, N.H.	\$15,000
For partial support of a survey and development activities for the New York State College Scholarship Information Bank 1978-79.	
Council on Foundations, Inc., New York, N.Y.	\$20,000
For 1978 membership support.	
Education Writers Association, Woodstown, N.J.	\$1,200
For partial support of a mid-career workshop at Harvard University in December of 1978 for selected educational journalists.	
Educational Facilities Laboratories, Inc., New York, N.Y.	\$10,000
In partial support of a project to develop the reasonable options for consideration in meeting the City University of New York's capital needs over the next decade.	
Educational Products Information Exchange Institute, New York, N.Y.	\$16,000
For part of the cost of moving the Institute to a site on the campus of the State University of New York at Stony Brook.	
The First Parish in Cambridge, Cambridge, Mass.	\$10,000
For support of the Cambridge Forum's proposal to videotape a series of programs on public affairs and obtain appropriate cable and outlet linkage.	
Henry Street Settlement, New York, N.Y.	\$20,000
In partial support of the development of a modern management system.	
Museums Collaborative, Inc., New York, N.Y.	\$20,000
In support of a Cultural Institutions Management Program.	
New School for Social Research, New York, N.Y.	\$10,000
For support of <i>The Fiscal Observer</i> , a twice-monthly report on New York City's finances and economy.	
New York City School Volunteer Program, Inc.	\$10,000
For general support.	

Particular Programs



Minority Engineering Education

Commitments through the Particular Program in Minority Engineering Education reached a peak of \$3.1 million in 1978, the fifth full year of the program. For the Foundation it was a year of consolidation and expansion of existing efforts in three primary areas of need: pre-college preparation of minority students for engineering study; development of improved pre-engineering curricula; and assurance of adequate student financial aid.

By the close of 1978 the Foundation had invested \$11.4 million in minority engineering education and the program, of limited life like all Particular Programs, had one more year of operation remaining. Attainment of the goal of population parity for the affected minority groups among first-year engineering students by 1982 still seemed a reasonable possibility, although some would predict parity by 1983, 1984, or even 1985. A strong and growing national network of interlocking efforts to graduate more minority engineers was largely in place. Engineering continued to be a highly popular field of study among college students, not least because in 1978 it offered its graduates the brightest employment prospects and the highest starting salaries of any baccalaureate program.

If the affected minorities—blacks, Hispanics, and native American Indians—are to obtain their share of the rewards of engineering, the growth of the national effort on their behalf must continue, through the sustained commitment of industry, public school systems, and the schools of engineering themselves. A number of enlightened industries have recognized that in their own interest and that of society, they must seek out and develop talented minority persons for leadership positions; in technical industries the leaders most often were trained as engineers. Thus the national minority engineering effort enjoys the support of many corporations whose names are household words; but the base of corporate support remains a narrow one. Federal

government agencies have not recognized minority engineering education as a matter deserving of special attention.

During 1978 the Foundation sought mainly to meet the immediate and short-term needs of organizations in this field which it had assisted, and in some cases brought into being, in previous years. Even for this limited purpose the \$3.1 million allocated was not enough; other funds will be needed by most of these grantees. All of these major activities have been discussed in previous Annual Reports, especially those for 1977 and 1976; a general description and brief progress reports will be presented here.

Regional Consortia

In the effort to expand the number of minority students prepared to study engineering, a central element has been the development of consortia of major engineering schools in various parts of the country. Each of these consortia has its individual features, related to its size, composition, and location, but all of them share certain general characteristics. The focus of their activities is on students in the public schools of their regions, preferably from the seventh grade up. The objective is to identify at an early age minority students who show aptitude for engineering, to inform them and their families about opportunities in engineering, and to see that they receive the necessary preparation in science, mathematics, and communication skills while in high school. (Programs for students already in college do not fall within the mission of the Sloan-supported consortia.)

In the more successful consortia, close ties have been established with local school systems, industries, and community groups. Whenever possible minority engineers and minority engineering students work with secondary-school students. They act as role models and help to introduce the students to the field of engineering and the methods and products of technology. The consortia provide various support services such as project activities, tutoring, and guides for industrial field trips. Active involvement and support by local and regional industries are essential to success. Through contacts with minority and community organizations, engineering career information is disseminated.

In the schools, the consortia and their member institutions try to ensure that guidance counselors are aware of engineering opportunities and that classroom instruction imparts the necessary quantitative and communicative skills. This is approached through workshops for teachers, counselors, and school administrators in some areas, and through the provision of special educational materials such as those being produced by the National Coordinating Center for Curriculum Development (see below). Teachers are encouraged to call on university and industrial engineers for assistance in

interpretation and adaptation of these materials. In some instances participating urban schools have added or restored important courses in science and mathematics to their curricula.

Within the memberships of the several consortia, numbering as many as seventeen individual campuses, some variations in approach are bound to occur. Some engineering schools have decided that exposure to computers is the way to get students interested in mathematics, science, and technology. Some conduct special summer sessions for selected minority high school students. Science and engineering clubs which meet after school or on Saturdays have proved effective in some places. In some areas efforts are concentrated on the "best" high schools having large minority populations; others cast the net more widely. In some programs significant numbers of non-minority as well as minority students are participating.

Since the oldest of these consortia dates back only to 1973, most of the students involved are not yet of college age and the long-term results remain to be measured. It seems safe to say that, whether or not the graduates of these programs enter engineering in great numbers, they will be better prepared than they otherwise would have been for life in today's technological society.

- The Southeastern Consortium for Minorities in Engineering was established in 1976 and has expanded rapidly since then. From its original base of seven engineering schools in five states it grew in 1978 to fifteen institutions in six states. (The new members are Auburn University; University of Alabama, Huntsville; University of Central Florida; University of South Florida; North Carolina State University; University of North Carolina; Christian Brothers College, and Memphis State University. The sixth state is North Carolina.)

Each engineering school appoints a faculty member as project coordinator for the school system or systems in that institution's area. The coordinator provides continuous support and advice to secondary schools as they work to enrich their science, mathematics, and language arts instruction with extensive use of materials from the National Coordinating Center for Curriculum Development. Each local program seeks to utilize community resources such as local industry and professional and parent groups, and to establish an engineering guidance program.

By 1978 some 4,600 minority students were involved in activities established through the Southeastern Consortium, and a further increase was projected for the Fall term. The Consortium laid plans for raising annual participation to 20,000 students through a six-year program costing \$1.9 million, well beyond what the Sloan Foundation could provide. The Consortium is seeking to raise the bulk of that amount from other sources, assisted by a final two-year Sloan grant of \$500,000. Earlier in the year the Founda-

tion made a supplemental grant of \$78,700 to support the expansion of the program during 1978. The grants were paid to Georgia Tech Foundation, Inc., and brought total Sloan support of the Southeastern Consortium to \$1,089,800.

- About one out of eight minority engineering freshmen in the nation is enrolled in one of the seventeen colleges of engineering which make up the Midwest Program for Minorities in Engineering, organized in 1975 by the Committee on Institutional Cooperation. Minorities make up nearly 10 per cent of the freshman enrollment of these engineering schools, and through this consortium the schools are working to maintain and increase the flow of well-qualified minority entrants.

CIC+ MPME, as this seven-state consortium is called, consists of engineering schools on thirteen campuses of the Big Ten universities plus Illinois Institute of Technology, University of Detroit, University of Notre Dame, and Wayne State University. Individually and in various combinations, these schools conduct a wide variety of pre-college programs. The largest collaborative programs are in Chicago and Detroit; others are working with schools in Milwaukee, Indianapolis, Minneapolis-St. Paul, Columbus, and several smaller cities.

The largest of the regional minority engineering consortia, CIC+ MPME has received Sloan support since its inception. A one-year grant of \$350,000, payable to Northwestern University, brought total support of this program to \$1,897,450.

- Equipment and materials which are no longer of use to industries can be valuable to schools for teaching purposes. The National Association for Exchange of Industrial Resources, of Northfield, Illinois, arranges gifts of such surplus items from industries to schools. It will now obtain such gifts for twenty schools in the Chicago and Detroit areas which are participating in the Midwest Program for Minorities in Engineering. The Association also conducts training sessions through which schools can learn to search out such gifts for themselves. The Association received a \$5,000 Sloan grant for this project.

- Minority students in California, including those from the large Chicano population, are being assisted toward engineering careers through a program called MESA (Mathematics, Engineering, Science Achievement). Starting with one high school and twelve students in 1970, the program became statewide in 1977 and is continuing to expand. It had ten MESA centers serving 1,000 students in 1977-78 and is currently growing to twelve centers with 1,500 students in 40 or more secondary schools. The ultimate goal is fifteen centers with 60 or more schools and 3,000 students.

Students in the MESA program take advanced science and mathematics courses supplemented by special tutoring, counseling, lectures, field trips, and

other special activities. Many are placed in Summer jobs in technical industries. Participants are in grades ten through twelve; MESA is now beginning guidance and information services to pre-MESA students at the junior-high-school level. In its initial operation by the University of California, Berkeley, a high percentage of the program's graduates elected to study engineering, science, and closely related subjects in college.

Participating institutions of higher education now include University of California campuses at Berkeley, Davis, Los Angeles, and Santa Barbara; California State University campuses at Northridge, Long Beach, Los Angeles, and Sacramento; San Jose State College, University of Southern California, and Stanford University.

Officers of leading California industries have formed an industrial advisory board to coordinate long-term industrial support and involvement with the MESA program. The William and Flora Hewlett Foundation of Palo Alto is providing major support for the continuing expansion of activities. The Sloan Foundation in 1978 made a final three-year grant of \$500,000 for MESA, payable to the University of California, Berkeley. The total Sloan contribution to MESA over five years has been \$765,525.

- Since 1973 PRIME—the Philadelphia Regional Introduction for Minorities to Engineering—has been working to increase the number of minority students from the Philadelphia area entering schools of engineering. During 1978 more than 1,500 students in junior and senior high schools took part in the PRIME program and 350 attended Summer enrichment sessions. There were 160 PRIME high-school graduates in 1978, of whom nearly a hundred planned to enter schools of engineering and sixteen were headed for four-year technology programs. All of these numbers represented significant increases over 1977.

The membership of PRIME is unusually comprehensive, embracing all the engineering colleges of the Philadelphia region, thirty private industries and public agencies, community groups, and the public school systems of Philadelphia, Camden, and Chester. Each PRIME secondary school is matched with a participating company or government agency which provides supplemental support services such as classroom demonstrations and projects, sites for field trips, and information about the engineering profession. PRIME also conducts workshops for teachers, from the Philadelphia area and elsewhere, to familiarize them with curriculum materials from the National Coordinating Center for Curriculum Development.

Over a three-year period beginning in 1975 the Foundation made grants totaling \$310,000 to PRIME. An additional and final two-year grant of \$175,000 was awarded in 1978.

- A consortium similar to PRIME, the Massachusetts Pre-Engineering Program for Minority Students (MassPep) was organized in 1978 to operate

a program for seventh- through twelfth-graders, initially in the Boston-Cambridge area. For partial support of its first year the Foundation made a grant of \$15,000 to the Eastern Massachusetts Urban League.

New Curricular Materials

- The National Coordinating Center for Curriculum Development, established with Sloan assistance in 1976, has as its principal function the preparation of educational materials in science, mathematics, and communication designed to help high-school students from minority groups become interested in and prepared for engineering study. Secondary-school teachers and engineering educators work together in preparing the materials, which are in the form of self-contained modules and mini-courses ranging in duration from one class session to two weeks. The modules are tried out and evaluated in public schools which are cooperating with regional consortia of the type described above. During the 1977-78 academic year more than 100,000 copies of the modules, mostly for grades nine and ten, were distributed to such schools. There were fifteen different modules ready for use at the start of the 1978-79 year, and eight more were to appear during the year.

The Center, which is at the State University of New York at Stony Brook, also prepares materials for one-day activities for science and mathematics classes, and materials for science and engineering clubs. It publishes teacher resource guides and on occasion works with the regional consortia in training teachers to use the new materials. Comments from teachers are reflected in revised versions of the modules.

In pursuit of another of its goals, stimulating communication among the various minority-engineering activities around the nation, the Stony Brook Center in the current academic year is overseeing the preparation of in-depth reports on pre-engineering activities in five selected geographic regions. These reports will be uniformly organized so as to be of assistance to others planning and conducting similar activities elsewhere.

For a third year of support of the National Coordinating Center for Curriculum Development the Foundation in 1978 made a grant of \$600,000, bringing its total support of this activity to \$2,158,000. The grant was paid to the Research Foundation of State University of New York.

Student Financial Aid

- The National Fund for Minority Engineering Students began operations in 1975 with an \$800,000 Sloan grant covering most administrative expenses for its first three years. As its name implies, the Fund was created to be the principal instrument for dealing with the severe problem of financial need faced by most minority students who hope to study engineering.

Three years later the Fund has defined its mission more precisely, gathered data on which to base scholarship-allocation decisions, and developed a method of operation designed to maximize the impact of its resources on the problem of minority underrepresentation in engineering. Donors channeled \$2.8 million through the National Fund in 1977-78, and for 1978-79 its goal is \$3 million.

Contributions to the Fund come largely from American business, which thereby underwrites its commitment to recruiting more minority personnel and offering them opportunities for advancement into managerial and professional ranks. Three-fourths of its 32-member Board of Trustees are industrial leaders, including the chairmen of some of the nation's largest corporations. Other members are prominent educators and leaders in the minority communities.

Through its Incentive Grants Program the Fund deals with about 70 colleges of engineering which subscribe to the Fund's goal of constantly increasing minority enrollments. The schools receive block grants in varying amounts, which they may divide among as many students as is feasible. The schools assemble the usual financial-aid packages including parental contributions, self-help (from loans or jobs), and federal and state grants where applicable, with the additional support from the Fund often making the difference between a student's attending or not attending an engineering school. Currently the Fund helps to support about 1,000 students. The Fund also coordinates a project through which Fund scholars are placed in Summer jobs with donor corporations.

The Fund has appointed a full-time development officer and over the next four years plans to recover more of its administrative costs from unrestricted contributions. For the initial expense of the development office and for continuing partial administrative support, the Sloan Foundation made a final four-year grant of \$850,000 to the National Fund for Minority Engineering Students.

- Minority members of engineering faculties are an extreme rarity, a situation which some engineering schools would like to change. As a preliminary step, a study is being made on behalf of the schools and departments of engineering of the eight Ivy League universities. It seeks to determine the level of minority representation in graduate engineering and applied science studies, the results of existing programs to increase that representation, and the prospects for support of a major effort in this area. The study is supported by a Sloan grant of \$19,819 to Yale University.

- Florida Institute of Technology, which has a sizable proportion of Cuban and other Hispanic students, has instituted a special program to attempt to reduce the high dropout rate among freshmen. The program, called Freshman Retention by Evaluation and Systematic Help (FRESH), is being assisted in its first year by a \$20,000 Sloan grant.

Cognitive Science

The Foundation's Particular Program in Cognitive Science, initiated in 1977, underwent further definition in 1978 as major grants totaling about \$1.1 million were awarded to six universities.

Cognitive science is such a young and rapidly changing field that there are differing interpretations of just what it is and what it includes. A working definition proposed by advisors to the Foundation is that it is the study of the principles by which mental capacities are organized, developed, and put to use. The six principal disciplines which converge in cognitive science are identified as neuroscience, computer science, psychology, philosophy, linguistics, and anthropology. These disciplines are interconnected by such sub-disciplines as neuropsychology and psycholinguistics.

What brings scientists of such seemingly disparate interests together in cognitive science is a common research objective: to discover the representational and computational capacities of the mind and their structural and functional representation in the brain. Philosophy, psychology, and linguistics, for example, all have their own approaches to the study of language. Some other topics at which the interests of two or more of the six disciplines intersect are learning and memory, visual perception, cognitive evolution, human information processing, and the functions of the two hemispheres of the brain.

Like neuroscience, the subject of an earlier Particular Program, cognitive science requires the joining of two or more disciplines in research projects and the training of young scientists who are skilled in more than one discipline. The early efforts of the cognitive science program have been directed toward bringing scientists from the relevant disciplines together so that the needed communication can be established. Grants thus far have been of an exploratory nature, intended to enable institutions with varying disciplinary strengths to consider the kinds of coordinated research and training programs

which they might develop in the future. Multi-disciplinary workshops for faculty and advanced trainees and programs of visiting scientists are being supported at major universities. In 1978 six institutions received grants for such activities, bringing the total number of such programs to ten. All of these grants are for two years.

- The diversity of approaches to problems in cognition is evident at Brown University, where cognitive research takes place in the Departments of Anthropology, Applied Mathematics, Computer Science, Engineering, Linguistics, Neuroscience, Philosophy, Physics, and Psychology. Scientists from many departments have established a Center for Neural Science and a Center for Cognitive Science which will serve as a nucleus for the coordinated research and training program in cognitive science which they hope to develop. As is true elsewhere, there are diverse opinions at Brown about the nature and the future of cognitive science. Those views will be discussed in a series of seminars with both local and outside speakers, leading, it is hoped, to the development of collaborative research projects; there will also be a series of workshops dealing with issues critical to the future of the field. The Foundation granted \$125,000 to Brown for these activities.

- The University of California, Irvine, for several years has conducted a program in cognitive science leading to a doctorate in psychology. Participating faculty members have expertise in linguistics, mathematical methods, visual and auditory perception, psycholinguistics, formal logic, psychobiology, and neurology. The focus of the research is on how children learn language. Already important progress has been made toward developing a theory that will account for the kinds of cognitive mechanisms involved in language learning, including its biological foundations.

Cognitive scientists at Irvine intend to build a major new research and training program on existing activities and to strengthen ties with other universities in Southern California. Visiting scientists are being brought to the campus for varying periods to learn about the Irvine approach to language learning and to contribute their own expertise. A series of continuing workshops for both resident faculty and visitors is considering the various lines of inquiry and possible new directions for research into language learning. Intensive Fall workshops focus on universal aspects of language and the biology of language. A Sloan grant of \$175,000 is assisting in this expansion of cognitive science at Irvine.

- The University of Chicago has an organizational structure which encourages the crossing of traditional disciplinary boundaries, as cognitive research requires. For some five years it has had a Committee on Cognition and Communication, a division of the Behavioral Sciences Department, which is autonomous in admitting its own students and establishing its own curriculum. Research interests of the Committee's members include linguistics,

cognitive anthropology, neuropsychology, cognitive development, ethology, and a variety of other relevant disciplines. Faculty members in neighboring departments also are engaged in research closely related to cognitive science.

The Committee on Cognition and Communication is initiating a program of visiting scientists and workshops designed to strengthen cognitive research by bringing together faculty from different departments who are working in related areas. Visiting scholars whose research specialties are not well represented at Chicago will provide an outside perspective on the research there and may stimulate new research projects. The workshops will focus on three themes, chosen to enhance existing strengths at Chicago and to explore possible new lines of development. They are: (1) the forms in which information is represented in the mind; (2) how sequential behavior such as speech is organized; and (3) human communicative systems. The Foundation granted \$131,000 in 1978 for this program.

- Cornell University Medical College has established a new Division of Cognitive Neuroscience within its Department of Neurology. The new Division was intended to focus on the study of human cognition and memory with investigations ranging from the biochemical to the behavioral level. Late in 1977 a Sloan-supported workshop on "The Cognitive Sciences and Brain Research," conducted by Cornell, impressed upon the attending neuroscientists and experimental psychologists the mutually supportive nature of their endeavors. The Department of Neurology at Cornell and the Experimental Psychology Group at neighboring Rockefeller University subsequently initiated a joint postdoctoral training program in cognitive neuroscience.

Cornell Medical College has embarked on a program of workshops and visiting scientists designed to expand the fruitful interaction between the cognitive scientist's understanding of mental processes and the neuroscientist's knowledge of physiological brain function. Over a two-year period the Division of Cognitive Neuroscience plans to bring in about five scientists per year, each to conduct a one-week workshop. Participants will include fellows from both Cornell and Rockefeller University. In addition to stimulating and shaping the research programs at those two institutions, the sessions will result in a series of published monographs. For support of this program the Foundation made a grant of \$222,000 to Cornell University.

- At the University of Massachusetts at Amherst a cooperative cognitive science program is concerned primarily with language and information processing and is centered in the Department of Computer and Information Science and the Department of Linguistics. Faculty members from other departments such as psychology, philosophy, and mathematics, and from nearby institutions, also are contributing to the program. A series of workshops and visiting scientists having expertise complementary to that of the resident faculty will help to shape a coherent research and training program.

The core faculty of the University of Massachusetts at Amherst program has identified four principal areas of study: (1) language learning and formal learning theory; (2) computational neurolinguistics and cognitive mechanisms; (3) interaction of semantic and syntactic processing—the ways in which word structure and meaning affect each other; and (4) prosodics, intonation, and speech perception—the study of how information is encoded in the sounds of speech and how the brain of the listener decodes that information. The University's cognitive scientists hope, through regular seminars and intensive workshops, and with the help of the visiting scientists, to establish collaborative research efforts which will find answers to some of these central questions in the field. For this work the Foundation made a grant of \$232,700 to the University of Massachusetts at Amherst.

- At Stanford University cognitive research is centered in the Departments of Computer Science, Philosophy, and Psychology, and there is a strong tradition of interdisciplinary research and training related to language. A new Department of Linguistics was established a few years ago, and the eventual creation of an Institute for the Study of Language is being discussed.

As a first step in that direction, cognitive scientists at Stanford are conducting a series of workshops concerned with various aspects of language structure and processing, about eight in all over a two-year period. The first workshop in the Fall of 1978 dealt with the semantics of natural language. In addition, some eight distinguished visitors in the areas of artificial intelligence, linguistics, philosophy, and psychology will be spending at least an academic quarter or two at Stanford exploring new research possibilities and participating in symposia and workshops. Stanford places particular emphasis on obtaining workshop participants from outside the University; many of them are from nearby private research centers and from other parts of the United States, and some are from abroad. The first visiting scientist is from Chile. The Foundation granted \$212,000 to Stanford for support of these activities.

Two other grants were made for workshops in cognitive science in 1978:

University of Illinois at Urbana-Champaign	\$18,000
In support of a workshop on event-related brain potentials in cognitive science.	
Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y.	\$17,800
In support of a workshop on biological information processing.	

Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and was incorporated in the state of Delaware. Mr. Sloan, who was for many years the chief executive officer of General Motors Corporation, was active in the affairs of the Foundation until his death in 1966.

The Foundation's basic interests are in science and technology, in economics and management, and in education and problems of society related to those interests. It operates through a General Program and through two or more Particular Programs, which are designed to concentrate specified resources on a closely defined problem area for a limited period of time.

The Foundation's program interests do *not* extend to religion, the humanities, the creative and performing arts, and medical research except for that conducted at the Sloan-Kettering Institute for Cancer Research. Requests involving activities outside the United States generally are discouraged, and the Foundation does not entertain requests for endowment funds, general support, or buildings, or for equipment which is not directly related to a Foundation-supported project. No grants are made directly to individuals.

Application may be made at any time for support of activities falling within the above guidelines. There are no deadlines and no special application forms except in the Sloan Fellowships for Basic Research. Letters of application usually are addressed to the President of the Foundation, and should state: (1) the specific nature of the problem to be attacked; (2) how the applicant plans to attempt to solve the problem; (3) the name(s) and qualifications of the person(s) to be responsible for the project; and (4) the expected cost and duration of the project. Often a preliminary letter of inquiry will be useful in helping the Foundation staff to determine whether submission of a full proposal would be appropriate. Like any large foundation, the Alfred P. Sloan Foundation is obliged to decline many more proposals than it supports. Even where a proposal appears to be of merit and is clearly within program, it must compete with many other proposals for a share of the limited funds available to the Foundation.

A grant application should be accompanied by documents indicating the applicant's tax-exempt status and its classification as either a private foundation or a publicly supported organization.

The Foundation is governed by a Board of Trustees assisted by a professional staff. Final disposition of all proposals is the responsibility of members of the Board.

Financial Review



Financial Review

The financial statements and schedules of the Foundation, which have been audited by Deloitte Haskins & Sells, independent certified public accountants, appear on pages 65 to 79. They include the balance sheets, the statements of income and fund balance, the statements of changes in financial position, the schedules of administration and investment expenses, the schedule of marketable securities, and the schedule of grants and appropriations.

Investment and other income in 1978 amounted to \$16,358,298, compared with \$16,567,212 in 1977. Investment expenses in 1978 totalled \$348,354, of which \$290,025 represented investment counsel fees. Provision for Federal excise tax amounted to \$317,461 in 1978. These deductions from income totalled \$665,815 in 1978, compared with \$986,942 in 1977.

Net investment income was \$15,692,483 in 1978, compared with net investment income of \$15,580,270 in 1977.

The total of grants and appropriations authorized and administration expenses during 1978 amounted to \$14,608,336, or \$1,084,147 under net investment income of \$15,692,483. Grants and appropriations totalled \$13,314,469 while administration expenses amounted to \$1,293,867. Over the Foundation's forty-four year history, the cumulative excess of grants and expenses over income has amounted to \$54,258,871.

The total of grant and appropriation payments in 1978 was \$13,436,958, compared with \$14,008,288 in 1977. Together with 1978 administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures in 1978 was \$15,723,143, compared with \$16,141,311 in 1977.

The market value of the Foundation's total assets of \$244,599,756 at December 31, 1978, including marketable securities valued at \$243,949,426, compared with total assets of \$253,454,907 at December 31, 1977. A sum-

mary of the Foundation's marketable securities at ledger amount and quoted market value at December 31, 1978 appears on page 70.

A listing of grants made during 1978 will be found on pages 76 to 79. Grants and appropriations authorized and payments during the year ended December 31, 1978 are summarized in the following table:

Grants and appropriations authorized but not due at January 1, 1978	\$14,037,816
Authorized during 1978	13,314,469
	<u>27,352,285</u>
Payments during 1978	13,436,958
Grants and appropriations authorized but not due at December 31, 1978	<u>\$13,915,327</u>

Income from investments credited to the General Motors Dealers Appreciation Fund during 1978, after provision for Federal excise tax, amounted to \$260,663. A grant of \$200,000 to the Sloan-Kettering Institute for Cancer Research was authorized and applied against this Fund, as set forth on page 32. Grant payments from this Fund during the year 1978 amounted to \$600,000.

The net worth of the Foundation at December 31, 1978, based on quoted market values, was divided as follows:

	Total Assets At Market Value	Grants and Appropriations Authorized But Not Due For Payment	Accrued Federal Excise Tax	Fund Balances At Market Value
General Fund	\$240,738,991	\$13,915,327	\$314,447	\$226,509,217
General Motors Dealers Appreciation Fund	3,860,765	—	5,307	3,855,458
Total	<u>\$244,599,756</u>	<u>\$13,915,327</u>	<u>\$319,754</u>	<u>\$230,364,675</u>

AUDITORS' OPINION

Alfred P. Sloan Foundation:

We have examined the balance sheets of Alfred P. Sloan Foundation as of December 31, 1978 and 1977 and the related statements of income and fund balance and of changes in financial position for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, such financial statements present fairly the financial position of the Foundation at December 31, 1978 and 1977 and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Our examinations also comprehended the supplemental schedules of administration and investment expenses for the years ended December 31, 1978 and 1977 and the supplemental schedules of marketable securities at December 31, 1978 and grants and appropriations for the year then ended. In our opinion, such supplemental schedules, when considered in relation to the basic financial statements present fairly in all material respects the information shown therein.

Deloitte Haskins & Sells

January 29, 1979

Balance Sheets

December 31, 1978 and 1977

	<u>1978</u>	<u>1977</u>
Assets		
Marketable Securities:		
Fixed income securities:		
U.S. Government and agency obligations	\$ 48,303,039	\$ 42,020,872
Other	22,595,390	14,607,573
Total fixed income securities	<u>70,898,429</u>	<u>56,628,445</u>
Common stocks:		
General Motors Corporation	41,677,643	43,676,544
Other common stocks	108,429,372	117,438,093
Total common stocks	<u>150,107,015</u>	<u>161,114,637</u>
Total marketable securities (quoted market: 1978—\$243,949,426; 1977—\$253,211,966)	221,005,444	217,743,082
Cash	650,330	242,941
TOTAL	<u><u>\$221,655,774</u></u>	<u><u>\$217,986,023</u></u>

Obligations and Fund Balance

Grants and Appropriations Authorized		
But Not Due for Payment	\$ 13,915,327	\$ 14,037,816
Accrued Federal Excise Tax	319,754	646,257
Fund Balance	207,420,693	203,301,950
TOTAL	<u><u>\$221,655,774</u></u>	<u><u>\$217,986,023</u></u>

See accompanying Notes to Financial Statements.

Statements of Income and Fund Balance

For the years ended December 31, 1978 and 1977

INCOME:	<u>1978</u>	<u>1977</u>
Investment income:		
Dividends	\$ 11,985,382	\$ 12,922,173
Interest	4,295,063	3,580,061
Other	77,853	64,978
	<u>16,358,298</u>	<u>16,567,212</u>
Less:		
Investment expenses	348,354	342,942
Provision for Federal excise tax	317,461	644,000
	<u>665,815</u>	<u>986,942</u>
Net investment income	<u>15,692,483</u>	<u>15,580,270</u>
Grants and expenses:		
Grants and appropriations authorized	13,314,469	13,501,831
Administration expenses	1,293,867	1,233,394
Total	<u>14,608,336</u>	<u>14,735,225</u>
Grants and expenses under income for the year	1,084,147	845,045
Cumulative excess of grants and expenses over income from inception to:		
Beginning of year	(55,343,018)	(56,188,063)
End of year	<u>(54,258,871)</u>	<u>(55,343,018)</u>
PRINCIPAL:		
Balance at beginning of year	258,644,968	250,995,322
Net gain on disposals of securities	3,034,596	7,649,646
Balance at end of year	<u>261,679,564</u>	<u>258,644,968</u>
FUND BALANCE AT END OF YEAR	<u>\$207,420,693</u>	<u>\$203,301,950</u>

See accompanying Notes to Financial Statements.

Statements of Changes in Financial Position

For the years ended December 31, 1978 and 1977

SOURCE OF FUNDS:	<u>1978</u>	<u>1977</u>
Investment and other income	\$16,358,298	\$16,567,212
Net gain on disposals of securities	3,034,596	7,649,646
	<u>19,392,894</u>	<u>24,216,858</u>
APPLICATION OF FUNDS:		
Grant and appropriation payments	13,436,958	14,008,288
Administration expenses	1,293,867	1,233,394
Investment expenses	348,354	342,942
Federal excise taxes paid	643,964	556,687
	<u>15,723,143</u>	<u>16,141,311</u>
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Change in ledger value of investments	3,262,362	8,376,992
Change in cash balances	407,389	(301,445)
NET CHANGE IN FUNDS	<u>\$ 3,669,751</u>	<u>\$ 8,075,547</u>

See accompanying Notes to Financial Statements.

Notes to Financial Statements

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accompanying financial statements have been prepared substantially on the accrual basis of accounting and, accordingly, reflect all significant assets and liabilities. Investment income and investment and administration expenses are recorded on the cash basis, the effect of which on the accompanying financial statements is not materially different from the accrual basis.

Marketable securities purchased are carried at cost; those received by gift or bequest are carried at quoted market value at date of gift or bequest. Gain or loss on disposal of securities is determined generally on the basis of first-in, first-out cost, but in certain instances the identified certificate basis is used. Net gain or loss on disposals is applied to the principal fund.

Grant appropriations are accrued at the time authorized by the Trustees and Federal excise tax is accrued in the year to which it relates.

2. RETIREMENT PLAN

The Foundation has a defined contribution retirement plan covering substantially all employees under arrangements with Teachers Insurance and Annuity Association of America and College Retirement Equities Fund which provides for purchase of annuities for employees. Retirement plan expense was \$113,792 and \$108,408 for 1978 and 1977, respectively.

3. LEASE

The Foundation occupies its office facilities under a lease which expires April 30, 1985 and provides for annual rentals, including escalation for real estate taxes and operating expenses, of approximately \$208,000 for 1979, net of approximately \$31,000 rental from sublease.

Schedule of Administration and Investment Expenses

For the years ended December 31, 1978 and 1977

	<u>1978</u>	<u>1977</u>
ADMINISTRATION EXPENSES:		
Salaries and employee benefits:		
Salaries	\$ 664,377	\$ 628,693
Employees' retirement plan and other benefits	188,975	174,354
	853,352	803,047
Rent (net of sublease rentals of approximately \$31,000 and \$30,000, respectively)	205,109	204,175
Program expenses	96,732	112,881
Office expenses and services	128,445	92,977
Reports and publications	29,613	34,612
Auditing and legal	38,945	39,137
	1,352,196	1,286,829
Total administration expenses		
Less: Allocation of administration expenses applicable to investments	58,329	53,435
Balance of administration expenses applicable to grant making	\$1,293,867	\$1,233,394
INVESTMENT EXPENSES:		
Investment counsel fees	\$ 290,025	\$ 289,507
Allocation of administration expenses applicable to investments	58,329	53,435
	\$ 348,354	\$ 342,942
Total investment expenses		

Schedule of

December 31, 1978

SUMMARY	Ledger Amount	Quoted Market Value	
		Amount	Percent of Total Investment
Fixed income securities:			
U.S. Government and agency obligations	\$ 48,303,039	\$ 44,896,022	18.4%
Other	22,595,390	21,301,092	8.8
Total fixed income securities	<u>70,898,429</u>	<u>66,197,114</u>	<u>27.2</u>
Common stocks:			
General Motors Corporation	41,677,643	53,750,000	22.0
Other common stocks	108,429,372	124,002,312	50.8
Total common stocks	<u>150,107,015</u>	<u>177,752,312</u>	<u>72.8</u>
Total marketable securities	<u>\$221,005,444</u>	<u>\$243,949,426</u>	<u>100.0%</u>

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
U.S. Government and Agency Obligations:			
Treasury Notes:			
6.875%—August 15, 1979	\$1,000,000	\$ 985,313	\$ 977,180
7.50%—January 31, 1980	2,000,000	1,971,250	1,938,120
7.625%—February 29, 1980	2,000,000	1,990,938	1,936,860
8.00%—May 31, 1980	1,400,000	1,397,812	1,357,552
8.625%—September 30, 1980	1,000,000	1,002,382	975,000
7.375%—May 15, 1981	2,100,000	2,088,188	1,992,375
7.875%—March 31, 1982	2,500,000	2,485,938	2,382,800
8.25%—June 30, 1982	4,090,000	4,086,483	3,945,541
7.00%—November 15, 1983	1,700,000	1,668,437	1,549,125
7.25%—February 15, 1984	1,100,000	1,102,922	1,007,523
8.00%—February 15, 1985	500,000	501,094	472,185
7.875%—May 15, 1986	3,252,000	3,498,797	3,012,165
8.25%—May 15, 1988	1,000,000	989,219	943,750

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Treasury Bonds:			
8.625%—August 15, 1993	\$1,000,000	\$ 996,847	\$ 963,430
8.625%—November 15, 1993	1,000,000	1,002,109	963,430
8.375%—August 15, 2000	1,000,000	988,125	941,870
Federal Intermediate Credit Banks Consolidated Bonds:			
6.95%—January 5, 1987	4,770,000	4,564,294	4,060,463
Twelve Federal Land Banks Consolidated Bonds:			
7.15%—July 23, 1979	2,000,000	1,934,375	1,958,740
7.30%—October 20, 1982	1,000,000	1,007,500	920,000
7.35%—January 20, 1997	2,795,000	2,667,478	2,354,788
Federal National Mortgage Association Debentures:			
7.05%—March 10, 1981	1,100,000	1,034,000	1,031,250
7.25%—June 10, 1981	300,000	297,656	280,500
6.65%—June 10, 1982	1,000,000	1,002,500	907,500
7.65%—March 11, 1985	2,000,000	1,991,250	1,810,000
8.60%—June 10, 1985	1,000,000	1,000,312	951,250
6.05%—February 1, 1988	1,000,000	996,250	808,750
7.00%—March 10, 1992	5,350,000	5,051,570	4,453,875
Total U.S. Government and agency obligations		<u>48,303,039</u>	<u>44,896,022</u>
Other:			
Undivided interest in demand notes:			
General Electric Company	427,000	427,000	427,000
Bank of America N.T. & S.A. Certificates of Deposit:			
10.00%—January 3, 1979	1,900,000	1,900,000	1,899,905
10.25%—January 22, 1979	350,000	350,000	350,000

Schedule of

December 31, 1978 (Continued)

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
Continental Illinois Bank & Trust Co., Chicago, Ill. 10.25%—January 4, 1979	\$1,400,000	\$ 1,400,000	\$ 1,399,972
First National Bank of Chicago, Ill. 10.20%—January 22, 1979	600,000	600,000	599,946
Manufacturers Hanover Trust Co., New York 10.20%—January 22, 1979	1,765,000	1,765,000	1,764,841
General Electric Credit Corporation Notes 7.00%—February 15, 1979	2,000,000	1,995,000	1,990,000
General Motors Acceptance Corporation Debentures 5.00%—September 1, 1980	1,300,000	1,300,000	1,183,000
5.00%—March 15, 1981	1,500,000	1,492,500	1,357,500
Household Finance Corporation Debentures 8.50%—May 15, 1983	1,000,000	997,500	943,750
Georgia-Pacific Corporation Notes 7.25%—January 15, 1985	1,000,000	941,250	875,000
American Telephone & Telegraph Co. Debentures 4.375%—April 1, 1985	1,500,000	1,518,210	1,168,125
Manufacturers Hanover Trust Co., New York 8.50%—June 1, 1985	1,000,000	973,440	943,750
Security Pacific Corporation Notes 8.80%—December 15, 1985	1,000,000	1,000,000	900,000
Aluminum Company of Canada, Limited Sinking Fund Debentures 9.50%—March 1, 1995	1,000,000	1,012,500	950,000

Marketable Securities

FIXED INCOME SECURITIES	Principal Amount	Ledger Amount	Quoted Market Value
International Paper Company Sinking Fund Debentures 8.85%—March 15, 1995	\$1,500,000	\$ 1,553,750	\$ 1,393,125
Dow Chemical Company Debentures 8.875%—May 1, 2000	1,337,000	1,382,240	1,280,178
Continental Oil Company 8.875%—June 1, 2001	1,000,000	1,000,000	911,250
Ohio Bell Telephone Company Debentures 9.00%—November 1, 2018	1,000,000	987,000	963,750
Total other		22,595,390	21,301,092
Total fixed income securities		\$70,898,429	\$66,197,114

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Allegheny Ludlum Industries, Inc.	81,900	\$ 1,818,749	\$ 1,197,788
Aluminum Company of America	30,000	1,210,863	1,432,500
American Home Products Corporation	60,000	1,804,325	1,687,500
American Telephone & Telegraph Company	45,000	2,516,817	2,722,500
Avon Products, Inc.	30,000	1,721,400	1,522,500
Baltimore Gas and Electric Company	50,000	1,389,650	1,218,750
BankAmerica Corporation	60,200	1,338,086	1,550,150
Bell Canada	29,400	1,370,323	1,613,325
Bristol-Myers Company	30,000	950,295	1,072,500
Caterpillar Tractor Co.	40,000	1,154,890	2,350,000
CBS Inc.	10,000	459,100	507,500
Central Telephone & Utilities Corporation	50,000	1,279,085	1,193,750

Schedule of

December 31, 1978 (Continued)

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Cincinnati Milacron Inc.	20,000	\$ 348,424	\$ 660,000
Citicorp	46,000	1,524,025	1,081,000
Cities Service Company	40,000	2,303,428	2,155,000
Coca-Cola Company	40,000	1,624,677	1,755,000
CPC International Inc.	19,000	904,060	935,750
Dow Chemical Company	60,200	1,630,311	1,497,475
Eastman Kodak Company	50,000	1,871,085	2,931,250
Engelhard Minerals & Chemicals Corporation	71,600	2,377,359	2,049,550
Ex-Cell-O Corporation	20,000	414,275	550,000
Exxon Corporation	88,334	2,355,534	4,339,408
Federated Department Stores, Inc.	25,000	811,875	800,000
First Bank System, Inc.	30,000	1,258,350	1,110,000
First Chicago Corporation	57,456	630,518	1,091,664
First International Bancshares, Inc.	25,000	740,894	828,125
Gannett Co., Inc.	10,000	382,750	407,500
General Electric Company	50,000	2,287,451	2,356,250
General Motors Corporation	1,000,000	41,677,643	53,750,000
General Public Utilities Corporation	67,600	1,339,585	1,183,000
General Reinsurance Corporation	9,000	1,893,850	1,593,000
Gulf United Corporation	45,000	691,050	585,000
Halliburton Company	30,000	932,276	1,980,000
Illinois Power Company	113,000	2,895,392	2,570,750
Integon Corporation	20,000	396,950	292,500
International Business Machines Corporation	48,000	5,321,227	14,328,000
International Minerals & Chemical Corporation	24,000	932,760	849,000
Johnson & Johnson	20,000	1,829,399	1,475,000
Kraft, Inc.	40,000	1,882,500	1,790,000
Lowe's Companies, Inc.	49,400	1,925,350	889,200
McDonnell Douglas Corporation	25,000	772,509	831,250
Merck & Co., Inc.	25,000	369,332	1,690,625
Minnesota Mining and Manufacturing Company	21,000	942,375	1,325,625
Mobil Corporation	47,000	1,419,765	3,260,625

Marketable Securities

COMMON STOCKS	Number Of Shares	Ledger Amount	Quoted Market Value
Monarch Capital Corporation	35,000	\$ 612,125	\$ 577,500
Monsanto Company	35,000	2,407,950	1,645,000
J. P. Morgan & Co. Incorporated	70,000	1,310,880	3,176,250
Motorola, Inc.	25,000	1,017,925	996,875
Panhandle Eastern Pipe Line Company	37,700	1,780,798	1,508,000
J. C. Penney Company, Inc.	59,400	3,696,036	1,804,275
Pennsylvania Power & Light Company	15,200	351,272	292,600
Perkin-Elmer Corporation	60,000	1,283,549	1,650,000
Philip Morris Incorporated	40,000	2,004,851	2,820,000
Pittston Company	68,580	2,227,089	1,191,578
Procter & Gamble Company	25,000	532,772	2,221,875
Ralston Purina Company	115,000	1,610,202	1,308,125
Revlon, Inc.	38,000	1,341,109	1,952,250
Roadway Express, Inc.	55,120	2,447,437	1,364,220
Jos. Schlitz Brewing Company	54,000	2,141,719	540,000
Schlumberger Limited	32,600	692,993	3,088,850
Sears, Roebuck and Co.	77,610	1,092,612	1,532,798
Southeast Banking Corporation	45,760	1,139,144	566,280
Southern Railway Company	27,000	1,571,844	1,258,875
Squibb Corporation	51,000	2,305,438	1,428,000
Standard Oil Company (Ohio)	50,000	1,396,401	2,125,000
Superior Oil Company	10,000	2,593,908	3,290,000
Tenneco Inc.	60,600	1,911,467	1,833,150
Times Mirror Company	15,000	423,007	446,250
Union Camp Corporation	49,500	2,204,762	2,363,625
United States Steel Corporation	32,250	1,391,319	685,313
United Technologies Corporation	67,500	2,496,108	2,624,063
Upjohn Company	30,000	1,388,537	1,466,250
Weyerhaeuser Company	40,000	1,033,199	985,000
Total common stocks		150,107,015	177,752,312
Total fixed income securities		70,898,429	66,197,114
Total marketable securities		\$221,005,444	\$243,949,426

Schedule of

	Authorized	Changes During 1978		Authorized
	But Not Due Dec. 31, 1977	Authorized	Payments	But Not Due Dec. 31, 1978
American Academy of Arts and Sciences	\$ 20,000		\$ 20,000	
American Association for the Advancement of Science	50,000		50,000	
American Council on Education	150,000		45,000	\$ 105,000
American Economic Association	115,000		55,000	60,000
American Enterprise Institute for Public Policy Research	200,000		200,000	
Association for the Integration of Management, Inc.		\$ 20,000		20,000
American Mathematical Society		3,300	3,300	
Association of American Colleges		6,000	6,000	
Babson College		189,000	110,000	79,000
Barnard College		39,800	29,900	9,900
Baruch College Fund		17,600	17,600	
Boston College	7,400	15,000	22,400	
Boston University	98,900	19,900	82,000	36,800
Bowling Green State University		20,000	20,000	
Brandeis University		39,600	19,800	19,800
British Columbia, University of		19,800	9,900	9,900
Brookings Institution	300,000		200,000	100,000
Brown University	24,250	144,800	59,150	109,900
Buena Vista College		17,000	17,000	
California, University of	702,750	1,350,942	752,092	1,301,600
California State University		19,150	19,150	
California Institute of Technology	194,400	99,000	203,900	89,500
Carnegie Institution of Washington	400,000		200,000	200,000
Carnegie-Mellon University	150,000		75,000	75,000
Case Western Reserve University		112,000	62,000	50,000
Chicago, University of	225,400	370,600	245,200	350,800
Citizens' Scholarship Foundation of America, Inc.		15,000	15,000	
City of Hope National Medical Center	7,850		7,850	
Clemson University		19,800	9,900	9,900
Cold Spring Harbor Laboratory	55,000	117,800	122,800	50,000
Colorado, University of	7,400		7,400	
Colorado State University		19,800	9,900	9,900
Columbia University	125,850	179,600	165,650	139,800
Connecticut, University of		13,300	13,300	
Cornell University	76,400	261,600	168,200	169,800
Council on Foundations, Inc.		20,000	20,000	
Council on Library Resources		600,000	120,000	480,000
Council on Science and Technology for Development		20,000		20,000
CUNY Urban Academy for Management, Inc.		300,000	100,000	200,000
Dartmouth College	93,000	150,000	193,000	50,000

Grants and Appropriations

	Authorized	Changes During 1978		Authorized
	But Not Due Dec. 31, 1977	Authorized	Payments	But Not Due Dec. 31, 1978
Denver, University of	\$ 234,000		\$ 97,000	\$ 137,000
Duke University	87,500	\$ 179,800	147,400	119,900
Eastern Massachusetts Urban League		15,000		15,000
Eastern Washington State College	9,000		9,000	
Education Writers Association		1,200	1,200	
Educational Facilities Laboratories, Inc.		10,000	10,000	
Educational Products Information Exchange Institute		16,000	16,000	
First Parish in Cambridge, Cambridge Forum, The		10,000	10,000	
Five Colleges, Inc.		20,000	20,000	
Florida, University of		19,800	9,900	9,900
Florida Institute of Technology		20,000	20,000	
Fordham University	47,500		47,500	
Foundation Center, The		120,000	40,000	80,000
Foundation for Research Into The Origin of Man		20,000	20,000	
George Washington University	30,000			30,000
Georgia Institute of Technology	7,400		7,400	
Georgia Tech Foundation, Inc.	250,000	578,700	328,700	500,000
Georgia Tech Research Institute	150,000		100,000	50,000
Guelph, University of		19,800	9,900	9,900
Hall of Science of the City of New York, Inc.		15,000	15,000	
Harvard University	193,950	174,400	268,650	99,700
Henry Street Settlement		20,000	20,000	
Houston, University of	7,400		7,400	
Illinois, University of	14,800	77,400	62,500	29,700
Illinois Institute of Technology	7,400		7,400	
Indiana University	9,000	39,600	28,800	19,800
Institute for Advanced Study		20,000	20,000	
Iowa State University	14,800		14,800	
Johns Hopkins University	16,850	19,800	26,750	9,900
Kentucky Research Foundation, University of		7,850	17,750	9,900
Lawrence University		160,000		160,000
Louisiana State University	9,000		9,000	
Marquette University	35,000		25,000	10,000
Maryland, University of	15,250	20,000	35,250	
Massachusetts, University of	9,000	232,700	109,000	132,700
Massachusetts Institute of Technology	1,370,850	431,000	1,176,850	625,000
McMaster University		19,800	9,900	9,900
Meharry Medical College		320,000	20,000	300,000
Miami, University of	175,000		85,000	90,000
Michigan, University of		19,800	9,900	9,900
Minnesota, University of	7,400		7,400	

Schedule of

(Continued)

	Authorized	Changes During 1978		Authorized
	But Not Due Dec. 31, 1977	Authorized	Payments	But Not Due Dec. 31, 1978
Mount Sinai School of Medicine of the City University of New York	\$ 7,850		\$ 7,850	
Museums Collaborative Inc.		\$ 20,000	20,000	
National Academy of Sciences	20,000	15,000	35,000	
National Association for the Exchange of Industrial Resources		5,000		\$ 5,000
National Bureau of Economic Research, Inc.		100,000	65,000	35,000
National Fund for Minority Engineering Students		850,000	250,000	600,000
New Mexico, University of	35,700		35,700	
New School for Social Research		10,000	10,000	
New York City School Volunteer Program, Inc.		10,000	10,000	
New York Public Library	225,000		100,000	125,000
New York University	155,250		85,250	70,000
North Carolina, University of		166,000	56,000	110,000
Northwestern University	245,100	369,800	605,000	9,900
Notre Dame, University of	157,400		157,400	
Oberlin College		280,000	100,000	180,000
Occidental College		19,500	19,500	
Ontario Institute for Studies in Education		200,000	100,000	100,000
Oregon, University of	7,400		7,400	
Oregon State University	9,000		9,000	
Palace of Arts and Science Foundation	45,000		45,000	
Pennsylvania, University of		59,400	29,700	29,700
Pennsylvania State University		64,672	34,972	29,700
Philadelphia Regional Introduction for Minorities to Engineering (PRIME)	125,000	175,000	125,000	175,000
Pittsburgh, University of		50,129	40,229	9,900
Polytechnic Institute of New York	75,000		75,000	
Princeton University	109,400	479,400	409,100	179,700
Princeton University Press		150,000	50,000	100,000
Public Communication Foundation for North Texas	100,000	(100,000)		
Purdue University	45,400		45,400	
Rand Corporation	180,000	12,500	102,500	90,000
Research Foundation of The City University of New York		38,000	38,000	
Research Foundation of State University of New York	419,100	600,000	719,100	300,000
Resources for the Future, Inc.		200,000	100,000	100,000
Rice University	9,000	39,800	38,900	9,900
Rochester, University of	7,400	150,000	57,400	100,000
Rockefeller University		50,800	40,900	9,900
Roosevelt University		19,800	19,800	
Rutgers University		6,180	6,180	

Grants and Appropriations

	Authorized	Changes During 1978		Authorized
	But Not Due Dec. 31, 1977	Authorized	Payments	But Not Due Dec. 31, 1978
Salk Institute	\$ 31,400	\$ (7,850)	\$ 23,550	
SIAM Institute for Mathematics and Society	61,000	87,000	92,000	\$ 56,000
Simmons College		18,000	18,000	
Sloan-Kettering Institute for Cancer Research	400,000	200,000	600,000	
Society for Neuroscience		10,000	10,000	
South Carolina, University of	14,800		14,800	
Southern California, University of	16,400	39,800	26,300	29,900
Stanford University	431,650	431,200	416,250	446,600
Swarthmore College	100,000			100,000
Sweet Briar College		16,000	16,000	
Syracuse University	75,000	19,800	84,900	9,900
Texas Alliance for Minorities in Engineering, Inc.	28,500		22,000	6,500
Texas, University of	195,850	219,800	126,750	288,900
Toronto, University of	23,800	37,800	51,700	9,900
Tulane University	300,000	19,800	159,900	159,900
Utah, University of	9,000		9,000	
Virginia, University of	43,350		43,350	
Virginia Polytechnic Institute and State University	9,000		9,000	
Washington University	175,000	39,600	94,800	119,800
Washington, University of	18,000	19,800	27,900	9,900
Wayne State University		59,400	29,700	29,700
Wellesley College		250,000	85,000	165,000
Wesleyan University		10,000	10,000	
Williams College	115,000		65,000	50,000
Wisconsin, University of		179,600	89,800	89,800
Yale University	395,400	203,019	374,619	223,800
Sloan Commission on Government and Higher Education	1,252,976	200,000	883,372	569,604
Sloan Fellowships for Basic Research to be granted in ensuing year	1,550,000			1,550,000
Officer Grant appropriation for grants in ensuing year	850,000			850,000
Book Program	248,244	300,000	57,827	490,417
Other appropriations for grants and related expenses	2,896	125,000	41,690	86,206
	<u>14,037,816</u>	<u>13,358,742</u>	<u>13,481,231</u>	<u>13,915,327</u>
Reduction for Grant Transfers		44,273	44,273	
TOTAL GRANTS AND APPROPRIATIONS	<u>\$14,037,816</u>	<u>\$13,314,469</u>	<u>\$13,436,958</u>	<u>\$13,915,327</u>

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