Alfred P. Sloan Foundation

ANNUAL REPORTS

Alfred P. Sloan Foundation

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

Report for 1983

Alfred P. Sloan, Jr.
1875—1966

The Life of Alfred P. Sloan, Jr., in Brief

Alfred Pritchard Sloan, Jr., was born in New Haven, Connecticut May 23, 1875, the first of five children of Alfred Pritchard Sloan, Sr., and Katherine Mead Sloan. His father, a machinist by training, was then a partner in a small company importing coffee and tea. The family moved to Brooklyn in 1880, where it was particularly active in the Methodist Church (young Alfred's maternal grandfather was a Methodist minister). Alfred, Jr., excelled as a student both in the public schools and at the Brooklyn Polytechnic Institute where he completed college-preparatory schooling. After some delay in being admitted to the Massachusetts Institute of Technology (which considered him too young when he first applied), he entered M.I.T. in 1892 and took a degree in electrical engineering in three years as the youngest member of his graduating class.

Mr. Sloan began his working career as a draftsman in a small machine shop, the Hyatt Roller Bearing Company of Newark, New Jersey. At his urging, Hyatt was soon producing a new, durable steel bearing for automobiles. In 1898 he married Irene Jackson of Roxbury, Massachusetts and the next year became President, at age 24, of Hyatt, where he supervised all areas of the company's business: manufacturing, financing, engineering, and marketing. Hyatt bearings became a standard in the automobile industry, and the company grew rapidly under his leadership. In 1916 the Hyatt Roller Bearing Company, together with a number of other manufacturers of automobile accessories, merged with the United Motors Corporation, of which Mr. Sloan became President. Two years later that company became part of the General Motors Corporation (itself established in 1908 as the General Motors Company), and Mr. Sloan was named Vice President in Charge of Accessories and a member of the Executive Committee.

He was elected President of General Motors in 1923, succeeding Pierre S. du Pont, who said of him on that occasion: "The greater part of the successful development of the Corporation's operations and the building of a strong manufacturing and sales organization is due to Mr. Sloan. His election to the presidency is a natural and well-

merited recognition of his untiring and able efforts and successful achievement." Mr. Sloan had developed by that time his system of disciplined, professional management that provided for decentralized operations with coordinated centralized policy control, which he applied to General Motors and set the Corporation on its course of industrial leadership. The next 23 years — Mr. Sloan's tenure as Chief Executive Officer of General Motors — were years of enormous expansion for the Corporation and of a steady increase in its share of the automobile market.

In 1937 Mr. Sloan was elected Chairman of the Board of General Motors and continued as Chief Executive Officer until 1946. When he resigned from the chairmanship in 1956, the General Motors Board said of him: "The Board of Directors has acceded to Mr. Sloan's wish to retire as Chairman. He has served the Corporation long and magnificently. His analysis and grasp of the problems of corporate management, his great vision and rare good judgment, laid the solid foundation which has made possible the growth and progress of General Motors over the years." Mr. Sloan was then named Honorary Chairman of the Board and retained that title until his death February 17, 1966. For many years before his death he devoted the largest share of his time and energy to philanthropic activities, both as a private donor to many causes and organizations and through the Alfred P. Sloan Foundation, which he established in 1934.

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Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and incorporated in the state of Delaware. Over the last five years the Foundation's grant expenditures have averaged $16 million a year, and assets at market value at the end of 1983 were $361 million. The Foundation publishes an annual report, free on request, that gives detailed information about all the programs and activities of the Foundation. It also publishes at irregular intervals other papers and reports related to its programs.

The main interests of the Foundation are in higher education, with an emphasis on science, technology, economics, management, and education for the public service; and on instructional programs and problems of society associated with these fields. The Foundation's activities do not extend to primary or secondary education, religion, the creative or performing arts, or to medical research or health care, or to the humanities except as noted below. Grants are not made for endowments or for buildings or equipment, and are very rarely made for general support or for activities outside the United States.

General and Particular Programs

In 1969 the Foundation adopted a mode of operation that distinguished between the "general program," under which the established interests of the Foundation were pursued, and a set of "particular programs," which focused on sharply defined topics for more limited periods of time. Four particular programs were developed and carried to completion between 1969 and 1979: one to increase the number of minority students in medicine and management; one to support experimental work in educational technology; one to help establish the new discipline of neuroscience; and one to increase the number of minority students in engineering. Expenditures in these programs ranged from nine to fourteen million dollars over a period of five to seven years.

The Foundation's fifth particular program, in cognitive science, is now in its third and final phase, and is reviewed later in this report. The sixth particular program, the New Liberal Arts Program, began in 1982 and is now in full operation; it too is reviewed later in this report.

How to Apply for a Grant

The Foundation's funds are spent in two ways: on programs and activities developed by the Foundation's staff and for which grants are made, usually on a competitive basis, in support of individuals and institutions; and in response

to proposals that come unsolicited to the Foundation and that are also judged competitively. In considering both types of proposals, the Foundation often seeks the advice of outside reviewers. The Foundation unfortunately is obliged to turn down many more proposals, often proposals of great merit, than its resources allow it to support.

Application can be made at any time for support of activities falling within the guidelines indicated above. Grants of $20,000 or less are made throughout the year by the officers of the Foundation and may be made up to $30,000 for projects with high travel costs; grants over that amount are made by the Trustees, who meet five times a year for that purpose. Letters of application are normally sent to the president of the Foundation and include, in addition to information about the applicant and the work the applicant proposes to do, information as to the cost and duration of the work, and in the case of new applicants the tax status of the organization that would administer the grant unless it is a recognized institution of higher education.

The Foundation has no deadlines or standard application forms. Often a brief letter of inquiry, rather than a fully developed proposal, is an advisable first step for an applicant, conserving his time and allowing the Foundation to give the applicant a preliminary response as to the possibility of support.

President's Statement

The Alfred P. Sloan Foundation will reach its fiftieth anniversary in 1984. It seems appropriate as we embark on the next 50 years to take stock of where we have been, where we are heading, and how we can best continue to carry out the objectives that Mr. Sloan had in mind for the Foundation.

Mr. Sloan, a realist as well as a humanist and philanthropist, looked upon the Foundation as an extension of his own life and work. Although he recognized the inevitability of change that might dictate a different course, he expected that the Foundation would "continue as an operating facility indefinitely into the future . . . to represent my accomplishments in this life." His accomplishments during his lifetime were, of course, of the highest order, and in themselves provide the most dramatic and lasting tribute to his extraordinary talent. Through the Foundation, his accomplishments have been extended and expanded.

From an initial gift of $500,000, Mr. and Mrs. Sloan eventually contributed to the Foundation more than $180 million (valued at the date of gift). The assets of the Foundation have grown to a total of $361 million as of the end of 1983, while grants made by the Foundation over nearly 50 years have totaled more than $367 million.

During the first 32 years of its existence, the Foundation had the great advantage of the direct personal involvement of its founder—not, as he put it, "as a working, day by day executive" but "in the nature of top policy." Mr. Sloan thought constantly and carefully about the future during his lifetime, and particularly about the future of the Foundation. In 1959, as the Foundation was completing the first 25 years of its operation, he put down his thoughts about the Foundation and its future in a memorandum addressed to the Board of Trustees for their consideration and possible guidance "as to how the activities of the Foundation were to be continued after I pass on."

The memorandum is a remarkable document—a typical example of Mr. Sloan's ability to analyze thoroughly and to articulate effectively. It provides graphic testimony to his deep thoughtfulness, and the tremendous depth and breadth of his understanding and sensitivity in many areas of human endeavor. Placed by Mr. Sloan in a sealed envelope marked "to be opened in an emergency," the memorandum was distributed to the Trustees following his death in 1966. It has again been distributed to the Trustees for consideration as the Foundation completes its first 50 years of operation.

The entire membership of the Board of Trustees has changed since the memorandum was written and since Mr. Sloan's death, but a continuity of purpose has been maintained through the intervening years. Some of the present Board knew Mr. Sloan personally in capacities other than as Trustees, and two of the officers of the Foundation, Claire Armstrong and Muriel P. Gaines, have served it almost from the beginning, including most of the period when

he was President. The Trustees, in their recent evaluation of Mr. Sloan's 1959 memorandum, all shared the feeling that the Foundation has followed the course set by him with a remarkable degree of consistency and effectiveness. They hope that Mr. Sloan would agree with this evaluation. Of the program of the Foundation, Mr. Sloan wrote in part:

> I would urge the Foundation to employ its resources [in] scientific and economic research in the various disciplines. I would particularly emphasize the need to support all constructive projects in basic research, upon which all scientific progress, and advanced technology depends . . . I would also like to see the Foundation explore in every possible way the expansion of education, as this is the foundation of all progress . . .
>
> I urge the Foundation to exercise its imagination in the creation of advanced projects. There are two kinds of projects as I see it: one is routine ones; the other is original ones. Real progress does not come from exploited mediocrities, but from exploited originalities.

The reference to "routine" projects in this passage was apparently a characteristic one. Warren Weaver in his brief memoir of Mr. Sloan, published in 1975 by the Foundation as one of its Occasional Papers and titled, "Alfred P. Sloan, Jr., Philanthropist," explains its meaning: "These involved assistance to some activity, necessary though not really very exciting, such as support for the central costs of national service organizations, routine publication costs, etc.; Mr. Sloan . . . was never very happy about such grants."

Throughout the 1959 memorandum, Mr. Sloan makes clear that he did not mean to tie the hands of his successors. He said in his opening paragraph:

> With such rapidly changing civilization as we are living in it is difficult to sit down and discount the future in terms of definite policies. 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 Foundation's first recorded grants were made in 1937 and 1938 and are described in a report covering those years. In 1938, seven grants were authorized in the total amount of $284,000. Since that time, the Foundation has published regular reports on its activities and its finances, every two years until 1964 and annually thereafter.

Until 1945, the Foundation's grants did not exceed $400,000 in any year, and were made largely for education of the general public in economics. Beginning in 1945, both the size and scope of the Foundation's activities increased dramatically.

Two institutions that bear Mr. Sloan's name were founded with major grants from the Foundation. In 1945, a grant of $4 million founded the Sloan-Kettering Institute for Cancer Research, associated with Memorial Hospital in New York City. During the 35-year period from 1945 to 1980, the Foundation's total gifts to Sloan-Kettering came to $35 million. Personal gifts from Mr. Sloan during his lifetime and at his death came to an additional $30 million.

In 1950, the Foundation made a grant of $5,250,000 to the Massachusetts Institute of Technology to found the School of Industrial Management, now called the Sloan School of Management. Almost half of this sum went to purchase and equip the building in which the School is still located.

The Foundation's oldest continuing program, the Sloan Research Fellowships, began in 1955 with fellowships to 22 physicists, chemists, and mathematicians at 16 universities and colleges. Current expenditures in this program, which now includes neuroscience and economics, are $2.2 million a year for 90 awards. Through 1983, the Foundation has spent over $38 million to assist 1,906 young researchers. Because these fellowships are limited to people under age 32, they help to launch productive research careers at a time when the fellows may still find it hard to compete for other funds against more established scholars. Ten former Sloan fellows have become Nobel laureates, two have received the National Science Board's Alan T. Waterman Award, and two have received the Fields Medal in mathematics. Two, Donald Langenberg and Frank Press, are now members of our Board of Trustees.

During the 1960's, the Foundation made a series of grants totaling over $4 million to the Courant Institute of Mathematical Sciences at New York University. Of this, $2 million went toward the construction of the Warren Weaver building in which the Institute is housed. Mr. Weaver, a distinguished mathematician and foundation officer who had been for many years with the Rockefeller Foundation, was then a vice president and Trustee of the Sloan Foundation. Mr. Sloan felt that grants for construction were appropriate only as part of a larger project that the Foundation wished to support. Some time after the grant to Courant, the Trustees decided to make no more grants for the construction or rehabilitation of buildings even under these circumstances. Such grants involved sums that were becoming so large that they had an adverse impact on the Foundation's other programs.

In 1969, the Foundation announced that it would make a large portion of its grants within sharply focused special programs to be called "particular programs." Each was to respond to a well-defined problem, and to have a definite term ranging from three to seven years. These programs are shaped by the Foundation's staff and advisers, and proposals within these programs respond to the Foundation's guidelines. The concept of the particular program still guides a large part of the Foundation's activity. Completed particular programs include the programs for minorities in medicine, management, and engineering, the program in neuroscience, and that in educational technology. Ongoing particular programs, described elsewhere in this report, are in cognitive science and the

new liberal arts. Expenditures made and committed to the particular program in Cognitive Science will exceed $20 million. This program, intended to probe some of the mysteries of how people think, combines elements of psychology, linguistics, neuroscience, and artificial intelligence into new and promising configurations. Such a new approach to a major scientific problem illustrates what Mr. Sloan meant by his term "originalities."

In sketching the highlights of a history of 50 years, it is tempting to mention only the largest grants or programs, and I have done so above. Yet in every established field in which the Foundation operates, its grants are now small relative to those made by federal agencies. Mr. Sloan had already noted this expanding role of government in his 1959 memorandum and concluded:

> . . . it may well be that the Foundation must withdraw from certain activities in the future because there is absolutely no use in trying to compete with the government.

The Foundation has in fact withdrawn from the area of undergraduate scholarships, in large part for this reason.

One way in which a private foundation can usually perform better than a federal agency is in flexibility and speed of response. These qualities are exhibited more often by our smallest grants than by our largest. Some projects fall through the cracks of the federal funding structure, for example when a scholar whose reputation has been established in one field decides to explore another. Sometimes unforeseen events in the course of a research or instructional project require a substantial unanticipated expenditure on short notice. Although the Foundation ordinarily deliberates carefully before making a grant, it can on occasion commit small amounts in a few days. These qualities of flexibility and promptness are enhanced by keeping the professional staff very small, by having it meet regularly as a whole, and by the absence of any sort of departmental structure. In this way, we hope we have preserved some of the qualities that the Foundation had until 1961 when Mr. Sloan as founder and President presided over the spending of his own money.

One cannot know whether the Foundation will survive another 50 years, but if it does I hope that it will continue, in Mr. Sloan's felicitous phrase, to exploit originalities.

During 1983, Franklin A. Long retired from the Board of Trustees, having served since 1970. His advice in all matters, and most especially in science and science policy will be missed by us all. Stephen White retired from the staff, which he joined in 1969. He played a very special role both as a prolific originator of new ideas and as a relentless exposer of nonsense.

Albert Reas
President

Grants and Activities in 1983

The New Liberal Arts Program

The Foundation's annual report for last year reviewed the history and purposes of the New Liberal Arts Program and gave details concerning the first round of grants. That information will not be repeated this year except in barest outline: after making planning grants of $10,000 to 30 of the nation's leading independent liberal arts colleges in the spring of 1982, the Foundation awarded grants of $250,000 each to 10 of these colleges in November 1982, and presidential discretionary grants of $25,000 to the other 20 colleges that took part in this first-round of competition. Thus 1983 was the first year of full-scale work at the colleges in the New Liberal Arts Program.

Activities vary widely in details from campus to campus but similarities are dominant. Workshops in computing for faculty members in the humanities and social sciences were nearly universal last year. Although the New Liberal Arts Program is not a program in computer literacy, facility with the computer is important to the main purposes of the program — the enrichment of the undergraduate curriculum in quantitative reasoning, the application of mathematics across many subjects and courses, and the teaching of technology and the principles of engineering to liberal arts students. Because the computer is an instrument of enormous power for such instruction, the Foundation was pleased to see most of the colleges conducting faculty workshops in computing as a necessary first step in the program. Workshops were also frequent last year in mathematical modeling and in statistics, organized on occasion by disciplines but more often interdisciplinary. Equally common were mini-grant programs through which small awards were made by institutions out of their Sloan funds to faculty members for self-education in the quantitative aspects of particular disciplines or courses. It is obviously too early for the colleges or the Foundation to assess these typical activities, but preliminary signs give everyone reason for optimism.

There are problems. Technology—what it is, how to teach it to liberal arts students, and why to teach it at all—continued in 1983 to be the most troublesome problem of the New Liberal Arts Program, as the Foundation supposed from the beginning it would be. Technology is an entirely new subject at most of the colleges. They have no engineering department and no experience with this kind of curriculum; even the colleges with engineering departments have a very limited experience in teaching the subject to students not majoring in it. Some of the grants summarized below indicate ways the Foundation is trying to be of further help to the colleges in this aspect of the program.

Other problems exist as well but it is fair to say that both the colleges and the Foundation are greatly encouraged by the first full year of operation. Enthusiasm among the colleges is high and a strong consensus to move ahead is evident. The phrase itself, "the new liberal arts," is now generally recognized in higher education and acceptance is growing of the central place of quantitative modes of thought in a liberal education.

We receive many proposals and inquiries from colleges and universities seeking support under the New Liberal Arts Program, but we have felt it necessary to continue to concentrate the program on the 30 colleges (a large group in itself) now engaged in the program, plus the other institutions discussed later in this section. The question is not merely one of resources, although that is an inescapable limitation; ignorance on the part of the Foundation and the colleges now in the program is also a limitation. To bring a large number of additional institutions into the program before we have a body of experience and tested teaching materials to offer them would be wasteful. Expansion there will very probably be in the future, and other resources may be available to go with Sloan's to finance such an expansion; but first we need to know more than we now do about how institutions can make and sustain such a fundamental change as is implicit in the New Liberal Arts Program before undertaking an expansion.

The first full year, then, of the New Liberal Arts Program augurs well for the future but demonstrates that time, effort, and commitment in abundance are going to be necessary for success. An outside advisory committee of the following persons assists the Foundation in all phases of the New Liberal Arts Program:

Elting E. Morison, Professor Emeritus, Massachusetts Institute of Technology, chairman of the committee

John G. Kemeny, Professor of Mathematics, Dartmouth College

Nannerl O. Keohane, President, Wellesley College

William Kessen, Eugene Higgins Professor of Psychology, Yale University

John G. Truxal, Distinguished Teaching Professor of Engineering and Applied Science, State University of New York, Stony Brook

Trustee Grants for Workshops in Technology

$627,000

In an effort to help the colleges develop materials and methods for teaching technology to liberal arts students, the Foundation made grants last year to finance five summer workshops, two held in 1983 and three to be held in 1984. In the order made, these grants were:

Research Foundation of the State University of New York **$165,000**
P.O. Box 9 (over one year)
Albany, New York 12201

The Foundation convened a meeting in January 1983 of faculty members from the 10 colleges that got major grants in the first round of competition and of engineering educators with experience in teaching technology to non-engineering students. Our purpose was to examine the feasibility of an extended "summer study," perhaps five or six weeks, to prepare a course on the principles of engineering to be tried out at the 10 colleges in the 1983-84 academic year. It was soon clear at this meeting that such a plan was too ambitious for the colleges, which needed more time for faculty development and related activities. A more modest plan was then adopted for a two-week summer workshop for the preparation, not of a full course in technology, but of a few instructional modules to be inserted into existing courses as a first experiment. These modules, adapted from materials used by engineers in university settings, were to be tailored to the students, faculty members, and academic environment of the colleges. Supported by this grant, the workshop took place at Wellesley College in August 1983 and was organized with great skill by John G. Truxal (identified above). Although it did not achieve its announced goals — the preparation of instructional modules — it achieved other goals equally important and laid the basis for additional workshops in technology to be conducted in the summer of 1984.

Massachusetts Institute of Technology **$162,000**
Cambridge, Massachusetts 02139 (over one year)

This grant supported a second workshop in technology in the summer of 1983. It focused on a particular technology — the technology of nuclear weapons and arms control — in which a deep interest already existed in the colleges; the workshop, that is, was an attempt to exploit an existing interest in a technology rather than to generate a new interest. The workshop was headed by Jack Ruina, Professor of Electrical Engineering and Computer Science at M.I.T., and was conducted jointly by the Arms Control and Defense Policy Program at M.I.T. and the Center for Science and International Affairs at Harvard. Unlike the Wellesley workshop, it was open to all 30 colleges taking part in the New Liberal Arts Program. It produced a certain amount of heated discussion, not surprisingly with such a volatile subject; but it achieved its primary goals and was judged a pronounced success by the great majority of those who attended. It was a valuable experiment that led the Foundation to develop other workshops on particular technologies, as the following item indicates.

Research Foundation of the State University of New York **$300,000**
P.O. Box 9 (over one year)
Albany, New York 12201

Acting on the Foundation's successful experience in the workshops of summer 1983, we invited John G. Truxal (identified above), perhaps the nation's best known educator in the teaching of technology to non-engineering students, to organize three more workshops for summer 1984, which are supported by this grant. One workshop will be conducted on the general plan of the Wellesley workshop of 1983 and will again be led by Professor Truxal with the help of a number of other engineering educators. A second workshop, on a technological topic to be identified by the participants, will also be conducted by Professor Truxal but will experiment with a different mode of operation involving a smaller group of faculty members from the colleges who will gather over the summer for several short meetings alternating with periods of work on their home campuses. A third workshop, on a topic in medical technology, will take place next summer at M.I.T. and follow this same mode with minor modifications. It is being organized by Ernest Cravalho, Matsushita Professor of Mechanical Engineering in Medicine and Associate Director of the M.I.T. Health Sciences Program; Margaret MacVicar, Professor of Physical Science and Cecil and Ida Green Professor of Education; and Leon Trilling, Professor of Aeronautics and Astronautics.

Other Trustee Grants in the New Liberal Arts

Massachusetts Institute of Technology **$152,000**
Cambridge, Massachusetts 02139 (over two years)

The Foundation made a grant of $47,000 in 1982 to M.I.T. to support a series of seminars whose purpose was to stimulate discussion and cooperative activities between universities and the colleges in the New Liberal Arts Program, particularly in engineering and technology. The seminars were organized by Professors MacVicar and Trilling (identified above) and moved from one college site to another last year, giving each host institution an opportunity to introduce a large number of its faculty members to the New Liberal Arts Program. This moving forum was an effective mechanism during the first year of the program. The present grant represents renewal support for an expanded set of activities over two years that will involve fewer seminars (which have now served their purpose) and greater efforts to help the colleges develop a permanent communications network. Other facets of the New Liberal Arts Program, such as a sabbatical leave plan that will allow faculty members from the colleges to spend an extended period of time in a university laboratory, will also be developed under this grant. (Project directors: Professors MacVicar and Trilling.)

Georgia Institute of Technology **$103,000**
225 N. Avenue, N.W.,
Atlanta, Georgia 30332 (over one year)

For many years the Foundation has made special provision for minority students and minority institutions in its programs. The New Liberal Arts Program will follow that tradition. To help us develop the minorities part of the program, this grant to Georgia Tech supported a collaborative project last year that brought faculty members from 18 predominantly black colleges together with a faculty team from that university. After a lengthy planning period, three "needs assessment" workshops were held at Georgia Tech at which faculty members from the colleges explored the concept of the new liberal arts and assessed the needs of their institutions in relation to the purposes of the New Liberal Arts Program. From this project came a plan, designed with the help of a steering committee of faculty members from Georgia Tech and the colleges, that will take effect mainly in 1984 and will therefore be reviewed in detail in the annual report for next year. Suffice it here to say that a two-part program will begin next year, one a continuation of the collaborative workshops between Georgia Tech and the 18 predominantly black colleges; and one a competition among the same 18 colleges for individual institutional grants. (Project directors: Melvin Kranzberg, Calloway Professor of the History of Technology; Paul G. Mayer, Regents' Professor of Civil Engineering; A.D. Van Nostrand, Head of the Department of English; and Donovan B. Young, Associate Professor of Engineering — all of Georgia Tech.)

Princeton University **$80,000**
Princeton, New Jersey 08544 (over one year)

David P. Billington, Professor of Civil Engineering at Princeton, has been notably successful in the teaching of engineering to liberal arts students. His special interest has been the technology of large structures such as towers and bridges, which have both a technological and aesthetic appeal to students. In collaboration with others on the Princeton faculty, he has played an active role in that university's program called "Humanistic Studies in Engineering." Professor Billington's materials, successful though they are in his own hands, need to be refined and broadened, and put into a form that can be disseminated to liberal arts colleges. This grant will help him convert his materials to a transportable form and also prepare a new set of materials on other kinds of technologies.

Massachusetts Institute of Technology **$40,000**
Cambridge, Massachusetts 02139 (over one year)

The use of quantitative methods in historical research has grown rapidly over the last 15 years, but has yet to make its way into the undergraduate curriculum of most institutions, especially liberal arts colleges. This grant supported a conference in the fall of 1983 at M.I.T. on the state of the art in quantitative history, the influence of quantitative history on research, and the implications of quantitative history for undergraduate education. The papers will be available from M.I.T. in 1984. (Project director: Peter H. Smith, Associate Dean of the School of Humanities.)

Most grants made by the Foundation up to $20,000 (up to $30,000 for conferences) are made by the officers of the Foundation; but small grants that are part of one of our "particular programs" (see the front matter of this report for details) are often presented to the Foundation's Trustees for consideration as a package. The following grants were made in this manner in 1983:

University of Massachusetts **$36,000**
Amherst, Massachusetts 01003 (over two years)

For Professor Frank Wattenberg of the Department of Mathematics to develop a freshman course in quantitative reasoning and mathematical applications.

Brown University **$32,000**
Providence, Rhode Island 02912 (over two years)

For the editing, production, and distribution for two years of the journal, *The Weaver*, sponsored by the Council for the Understanding of Technology in Human Affairs. (Project director: Barrett Hazeltine, Professor of Engineering and Associate Dean of the College.)

Research Foundation of the State University of New York **$30,000**
P.O. Box 9
Albany, New York 12201 (over two years)

For a series of exploratory workshops in the new liberal arts to be attended by faculty members from a number of SUNY campuses. (Project director: Sherry H. Penny, SUNY Vice Chancellor for Academic Programs, Policy, and Planning.)

Harvard University **$18,000**
Cambridge, Massachusetts 02138 (over one year)

For faculty members in sociology from Boston-area colleges to attend a summer course at Harvard that stresses quantitative methods and materials in that discipline. (Project director: James A. Davis, Professor of Sociology.)

Yale University **$12,000**
New Haven, Connecticut 06520 (over one year)

For a study of institutional change in colleges taking part in the New Liberal Arts Program. (Project director: William Kessen, Eugene Higgins Professor of Psychology.)

Two internal appropriations were approved by the Trustees in 1983 in the New Liberal Arts Program. One for $90,000 will provide planning grants in 1984 to the predominantly black colleges discussed above; and one for $15,000 met the costs of a conference last year of presidents and Sloan project directors from the 10 colleges that received major grants in the New Liberal Arts Program.

One officer grant was made in this program in 1983:

Stanford University **$19,000**
Stanford, California 94305 (over one year)

Support for an interdisciplinary planning project concerned with the teaching of quantitative reasoning to liberal arts students. (Project director: James L. Adams, Associate Dean of Engineering.)

The Cognitive Science Program

Our program in cognitive science, the largest and longest of the six "particular programs" the Foundation has conducted since the concept of particular programs was adopted in 1969, continued last year to move through its third and final phase. This highly interdisciplinary program of basic research embraces the fields of psychology, neuroscience, linguistics, computer science, philosophy, and anthropology, and may encompass still others in the future. Its central concern, which gives the field its fascination for both researchers and laymen, is with nothing less than man's understanding of his own mental makeup; with the intricate and little understood processes by which human beings reason, remember, acquire language, solve problems, make decisions, and take actions on the basis of information the brain receives through the sensory organs.

The program began in 1977 with grants to researchers in academic fields that at the time were only loosely related, if at all. The Foundation's early grants helped researchers begin to work together and to develop some understanding of the concepts and methods of one another's disciplines. From these interdisciplinary beginnings many new lines of research emerged. The program entered its second phase in 1979 with major grants to institutions for the development of postdoctoral training programs. The third and last phase of our program commenced in 1981, overlapping with phase two, and is expected to extend through the 1987-88 academic year. Grants in phase three continued in 1983 and were again concentrated, as in previous years, on institutional development: on the establishment at each participating university of a self-sustaining center, institute, or department where a long-term program of training and research in cognitive science will be carried out after Sloan support comes to an end.

To ensure the orderly development of phase three, the Foundation's Trustees took the unusual step in 1981 of identifying those universities to which grants were expected to be made throughout the final phase of the program, and of committing the Foundation to these grants, totaling $10 million, as proposals were perfected and individually approved in the future. By the time the final grants are made in phase three, the Foundation will have invested over $20 million in this new field.

An outside advisory committee of the following persons assists the Foundation in all aspects of the Cognitive Science Program:

Robert Q. Marston, President, University of Florida, chairman of the committee

Theodore H. Bullock, Professor of Neurosciences, University of California, San Diego

Jerome A. Feldman, Professor of Computer Science, University of Rochester

William Kessen, Eugene Higgins Professor of Psychology, Yale University

William A. Nierenberg, Director, Scripps Institution of Oceanography

Sherwood Washburn, Professor Emeritus of Anthropology, University of California, Berkeley

Trustee Grants in Cognitive Science

University of California, Berkeley — **$1,500,000**
Berkeley, California 94720 — (over three years)

This grant, one of the largest in the program, follows smaller grants to Berkeley in 1979 and 1981, and will be used to meet the costs of establishing an Institute of Cognition at the university. The unorthodox approach researchers at Berkeley take to cognitive science — sometimes called the "Berkeley approach" — is characterized by a vigorous skepticism toward some of the basic assumptions underlying research at other cognitive science centers. Berkeley philosophers, for example, have been extremely critical of some prominent claims made for artificial intelligence. There is no reason, they assert, to believe that machine intelligence can ever approximate human intelligence or achieve anything like human consciousness. Similarly, the Berkeley linguistics department has become a center of opposition to transformational theory as developed at M.I.T. A major attempt has been made at Berkeley to develop a theory of language that is part of a general theory of action, an approach that differs sharply from the more analytic attempts of transformational linguists to segregate linguistic competence from the other psychological mechanisms involved in language use. Because the field of cognitive science is so new and research is still so rudimentary, it seems to us and to our outside advisory committee only prudent for the Foundation to place some bets on those who dissent from majority views. Interdisciplinary collaboration is extraordinarily high in cognitive science at Berkeley, and this grant will help formalize such relationships through the Institute of Cognition. (Project director: Robert Wilensky, Associate Professor of Computer Science.)

Stanford University — **$500,000**
Stanford, California 94305 — (over three years)

This is the Foundation's third grant to Stanford in cognitive science, the others having been made in 1978 and 1979. Stanford is unusual among the universities that have taken part in the Cognitive Science Program in that its interdisciplinary commitment has been strong and broad from the beginning, whereas that kind of commitment developed more slowly at other universities. Four departments at Stanford have been full partners in the research that has been going forward: psychology, computer science, linguistics, and philosophy. This group has already distinguished itself through its contributions to research and to the fundamental questions of cognitive science. The present grant will help the university establish a Center for Cognitive Science whose major purpose will be to develop an instructional program for graduate students from all four participating departments; the grant will also provide predoctoral and postdoctoral fellowships and meet other costs associated with the Center. (Project director: Gordon H. Bower, Professor of Psychology and Chairman of the Department.)

University of California, Irvine — **$500,000**
Irvine, California 92717 — (over five years)

The research group at Irvine received grants in 1978 and 1980 and has occupied a prominent place in our Cognitive Science Program from the outset. It is particularly strong in the theoretical aspects of the field and, with this third grant, will establish an Institute for Theoretical Studies in the Cognitive Sciences wherein the university's activities can be concentrated. This grant will help the Irvine group sustain the work it has done on a number of difficult theoretical problems. For example, further development of the "learnability theory" for natural language, first propounded at Irvine, will be emphasized; an effort will also be made to develop a deductive theory of human decision-making modeled on the deductive theory of language already developed within the framework of generative grammar; and further work will be done to develop a computational theory of low-level visual processing. One or more such fundamental problems will be selected each year for intensive study by the Institute. The university has made a substantial commitment to the support of the Institute during this final Sloan grant and afterwards. (Project directors: Kenneth Wexler, Professor of Psychology; Peter W. Culicover, Professor of Cognitive Science; and Mary-Louise Kean, Professor of Cognitive Science.)

The last phase of the Cognitive Science Program, as indicated above, is concerned with the establishment of centers or institutes that promise to give research and education in this field a permanent home on a number of university campuses; but we believe it important at the same time to make smaller grants available for interdisciplinary projects of special importance. The following three Trustee grants are of that kind. It is not a coincidence that they all occupy the border between neuroscience (the field in which Sloan had an earlier "particular program" and that prepared the way for the present program) and cognitive science. As cognitive science attempts to deepen its analysis of intelligent behavior, information about the functioning of the central nervous system has an important role to play by suggesting an architecture for cognitive models and providing data that guide researchers in their decisions regarding competing cognitive models. Conversely, neuroscience can often be strengthened when the interpretation of neural structure and function is informed by a cognitive analysis of the psychological processes carried out by the nervous system. The three grants all have in common the aim of enriching the complementary relationship between neuroscience and cognitive science.

Massachusetts Institute of Technology **$140,000**
Cambridge, Massachusetts 02139 (over two years)

Before his untimely death last year, David Marr of M.I.T.'s Laboratory of Artificial Intelligence had made sustained progress in his studies of the early stages of visual processing. In collaboration with Shimon Ullman and Tomaso Poggio, he succeeded in relating his computational analysis of visual processes to both psychophysical and neurophysiological data. This work is an outstanding example of how cognitive science and neuroscience can be fruitfully combined. This grant will allow Professors Ullman and Poggio to continue their research, conduct a series of small conferences, and effect visiting arrangements with other laboratories. (Shimon Ullman and Tomaso Poggio are Associate Professors of Psychology.)

Johns Hopkins University **$62,000**
Baltimore, Maryland 21218 (over two years)

The chief barrier between cognitive science and neuroscience may turn out to be a matter of theory. Cognitive science has attempted to simulate behavior by means of models based on a single powerful computer carrying out sequential operations on information stored in a separate memory (the so-called von Neumann architecture), but the brain appears to be a massively parallel system in which computations are distributed over large numbers of more limited processors acting together. It is increasingly clear that many cognitive operations can

only be understood by means of a study of the parallel algorithms that implement them. Terrence J. Sejnowski, Assistant Professor of Biophysics at Johns Hopkins, and Geoffrey E. Hinton, Assistant Professor of Computer Science at Carnegie-Mellon University, have collaborated for several years in the development of a theory of parallel computation. This grant will permit them to conduct a series of workshops that will bring together computer scientists and mathematicians working on parallel computational models with neurobiologists and cognitive psychologists working on the cognitive systems in each area.

Harvard University **$50,000**
Cambridge, Massachusetts 02138 (over two years)

Cognitive scientists have typically conceived of thinking as a matter of the brain's manipulating abstract symbols, but introspective evidence from many individuals, Einstein among them, suggests that thought takes place in terms of images. Psychologists have avoided imagery because it is evanescent and hard to measure, but these problems have begun to yield to research. A group of investigators at Harvard under Stephen Kosslyn, Professor of Psychology, has led the way in attempts to construct a coherent computational model of mental imagery. With this grant, Professor Kosslyn and his colleagues, working with other cognitive psychologists, computer scientists, and neuropsychologists, will push toward the development of a more coherent model of internal visualization.

Officer Grants in Cognitive Science

Bank Street College **$20,000**
610 West 112th Street (over one year)
New York, New York 10025

For a workshop on the application of cognitive science to the assessment of new computer technologies as they relate to the development of writing skills in children. (Project directors: D. Midian Kurland, and Roy D. Pea, Research Psychologists.)

Marine Biological Laboratory — **$4,000**
Woods Hole, Massachusetts 02543 — (over one year)

Partial support for a symposium on color vision—a topic that lies at the intersection of cognitive science and neuroscience. (Project director: Dr. Alan Fein, Research Scientist.)

Massachusetts Institute of Technology — **$19,700**
Cambridge, Massachusetts 02139 — (over one year)

For a conference of philosophers and cognitive scientists on philosophical issues in cognitive science. (Project director: Jerry A. Fodor, Professor of Linguistics and Philosophy.)

Princeton University — **$10,000**
Princeton, New Jersey 08544 — (over one year)

Partial support for a conference on the neurobiology and psychology of memory. (Project director: George A. Miller, Professor of Psychology.)

University of Illinois, Urbana-Champaign — **$2,500**
Champaign, Illinois 61820 — (over one year)

Partial and supplementary support for a conference on the philosophical implications of psychophysiological research. (Project director: Emanuel Donchin, Professor of Psychology.)

University of Michigan — **$15,500**
Ann Arbor, Michigan 48109 — (over one year)

For a book titled, *The Process of Induction*, to be done by a philosopher, a cognitive psychologist, a social scientist, and a computer scientist. (Project director: Keith Holyoak, Professor of Psychology.)

University of Oregon — **$30,000**
Eugene, Oregon 97403 — (over one year)

For a conference, part of the "Attention and Performance" series, on neural mechanisms of attention and search. (Project director: Michael I. Posner, Professor of Psychology.)

University of Pennsylvania — **$7,000**
Philadelphia, Pennsylvania 19104 — (over one year)

Partial support for a workshop to be attended by cognitive scientists and neuroscientists on the role of structural constraints in cognitive development. (Project director: Rochel Gelman, Professor of Psychology.)

University of Rochester — **$25,000**
Rochester, New York 14627 — (over one year)

For the fifth annual meeting of the Cognitive Science Society, the principal professional association in the field. (Project director: Patrick J. Hayes, Luce Professor of Cognitive Science.)

Sloan Research Fellowships

$2,200,000 over two years

The Foundation's program known as Sloan Research Fellowships entered its 28th year in 1983, making it by far the oldest program of the Foundation. It has grown in size and cost over the years and now includes several disciplines not covered at the beginning in 1955 (one of which — neuroscience — did not exist at that time); but the purpose of the progam remains the same: to stimulate fundamental research by young scholars of outstanding promise at a time in their careers when their creative abilities are especially high and when government or other support is difficult to obtain. An evaluation of this program a few years ago by the staff of the Foundation, together with the kind of continuous but informal evaluation that comes to the Foundation in the normal course of our work, gives us confidence in the Sloan Research Fellowships as well as satisfaction with the reputation the program enjoys in the academic field.

These yearly awards are now made in five fields: physics, chemistry, neuroscience, economics, and pure and applied mathematics. The value of the awards was raised in 1982 from $20,000 to $25,000; the funds are normally expended by the fellow over a two-year period. The awards are administered by the fellow's institution and are designed to permit him the greatest possible freedom and flexibility in their use. The fellow need not pursue a specified research project and is free to change the direction of his research at any time. The award may be used for equipment, summer support, professional travel, computer time, research assistants, or other purposes approved by the fellow's institution. Former fellows report that this flexibility often gives the awards a value well beyond their dollar amounts. They also report that the early recognition of outstanding promise which the fellowship confers, after years of arduous preparation, is an immensely encouraging stimulus in their careers.

The 1983 awards reflect the great variety and depth of modern science. This year's fellows, whose average age is 31, include a neuroscientist working on the neural basis of memory, an economist studying alternative forms of work, a physicist developing mathematical aspects of quantum field theory, and a chemist pursuing the theory of polymer systems. With these awards, the Foundation has spent over $38 million since 1955 to assist 1,906 young researchers. Among the alumni of the program are 10 Nobel laureates and many other holders of distinguished awards in their fields.

Candidates for Sloan Research Fellowships are nominated by senior scholars familiar with their work. For the 1983 awards, 400 nominations were reviewed by a committee of distinguished senior scientists and economists, as follows:

Chemistry
- Ronald Breslow, S.L. Mitchill Professor of Chemistry, Columbia University
- Richard H. Holm, Professor of Chemistry, Harvard University
- John S. Waugh, Professor of Chemistry, Massachusetts Institute of Technology

Economics
- Richard Quandt, Professor of Economics, Princeton University
- Michael Rothschild, Professor of Economics, University of California, San Diego
- James Tobin, Professor of Economics, Yale University

Mathematics
- S. S. Chern, Professor of Mathematics, University of California, Berkeley
- Peter D. Lax, Professor of Mathematics, New York University
- David Mumford, Professor of Mathematics, Harvard University

Neuroscience
- Eric R. Kandel, Professor of Neurobiology, Columbia University
- Seymour S. Kety, Professor of Neuroscience, Harvard Medical School
- Eliot Stellar, Professor of Physiology, Psychiatry and Anatomy, University of Pennsylvania

Physics
- William M. Fairbank, Professor of Physics, Stanford University
- Malvin A. Ruderman, Professor of Physics, Columbia University
- Kenneth G. Wilson, Professor of Physical Science, Cornell University

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The following scholars, listed by institution and field, received the 1983 awards:

University of Alabama
Neuroscience: Michael J. Friedlander

University of Arizona
Mathematics: Tudor S. Ratiu

Boston College
Chemistry: Evan R. Kantrowitz

Boston University
Mathematics: David Fried

Brandeis University
Mathematics: Michael Harris
Physics: Laurence F. Abbott

Brown University
Economics: Louis Putterman
Physics: Robert A. Pelcovits

California Institute of Technology
Chemistry: Dennis A. Dougherty
Mathematics: W. Hugh Woodin

University of California, Berkeley
Physics: Orlando Alvarez

University of California, Los Angeles
Mathematics: Daniel Michelson

University of California, Los Angeles, School of Medicine
Neuroscience: Nicholas Brecha

University of California, San Diego
Mathematics: Gunnar E. Carlsson
Neuroscience: William A. Harris
Chemistry: William C. Trogler

University of Chicago
Chemistry: Steven J. Sibener
Economics: Laurence Weiss
Neuroscience: Mark E. Gurney
Physics: Frank S. Merritt
Michael S. Turner

College of William and Mary
Physics: Mark S. Conradi

Columbia University
Physics: David J. Helfand
Charles H. Langmuir

Columbia University, College of Physicians and Surgeons
Neuroscience: Jurgen Brosius

Cornell University
Mathematics: Birgit Speh
Neuroscience: Timothy J. DeVoogd
Physics: James M. Cordes
G. Peter Lepage

Cornell University, New York State College of Veterinary Medicine
Neuroscience: Robert E. Oswald

University of Delaware
Chemistry: Douglass F. Taber

Florida State University
Chemistry: Lanny S. Liebeskind

Georgia Institute of Technology
Mathematics: Evans M. Harrell

University of Georgia
Mathematics: Robert S. Rumely

Harvard University
Chemistry: Kevin S. Peters
Economics: David M. Kreps

Harvard University, Harvard Medical School
Neuroscience: Alan L. Willard

University of Illinois
Chemistry: Thomas B. Rauchfuss
Mathematics: Bruce A. Reznick

Indiana University
Chemistry: David R. Williams

University of Kentucky
Chemistry: Laren M. Tolbert

Louisiana State University
Physics: Chris H. Greene

Massachusetts Institute of Technology
Economics: Eric S. Maskin
Mathematics: David A. Vogan, Jr.
Physics: Charles R. Alcock
Lennox L. Cowie

University of Massachusetts
Chemistry: M. Muthukumar

Michigan State University
Mathematics: Selman Akbulut

University of Minnesota
Chemistry: Paul F. Barbara
John F. Evans
Wayne L. Gladfelter
Physics: John M. Dickey
Robert C. Kennicutt, Jr.

University of New Mexico
Chemistry: James D. Satterlee

New York University, Courant Institute of Mathematical Sciences
Mathematics: Sergiu Klainerman
Peter Sarnak

New York University, School of Medicine
Neuroscience: Mary E. Hatten

University of North Carolina
Physics: Steven M. Christensen

Northwestern University
Neuroscience: Joseph S. Takahashi

Ohio State University
Chemistry: David J. Hart
Ming-Daw Tsai
Mathematics: Paul D. Seymour
Physics: Thomas R. Lemberger

University of Pennsylvania
Mathematics: Christopher B. Croke
Vaughan F. R. Jones
Wolfgang Ziller
Physics: Eugene J. Mele
Paul J. Steinhardt

Princeton University
Mathematics: David W. Catlin
Physics: Ian K. Affleck
Malcolm J. Perry

Salk Institute for Biological Studies
Neuroscience: David G. Amaral

University of South Carolina
Chemistry: John H. Dawson

Stanford University
Economics: Ben S. Bernanke
Thomas E. MaCurdy

Stanford University, School of Medicine
Neuroscience: Andrew R. Hoffman
Eric I. Knudsen

State University of New York at Buffalo
Chemistry: Jim D. Atwood

University of Southern California
Physics: Christopher M. Gould

University of Texas at Austin
Chemistry: Alan Campion

University of Virginia
Chemistry: Michael F. Brown

Washington University
Chemistry: Jeffrey Skolnick

Washington University, School of Medicine
Neuroscience: Jeff W. Lichtman

University of Washington, School of Medicine
Neuroscience: Helen Sherk

Wesleyan University
Chemistry: Philip H. Bolton

University of Wisconsin
Mathematics: Chien-Fu Wu

University of Wyoming
Neuroscience: Randolph V. Lewis

Yale University
Physics: Jolie A. Cizewski

Science, Technology, and Mathematics

Again in 1983 as for several years before that, the Sloan Research Fellowships together with our particular program in Cognitive Science (both reviewed above) constituted the principal support of science by the Foundation. Other grants in science are reviewed in this section. In engineering and technology our activities were also limited, as they have been in recent years. Instruction in technology for non-engineering students plays a central role in our New Liberal Arts Program (also reviewed above), and the Foundation made substantial investments to advance that purpose last year; but this new venture involves only a handful of engineering educators working in a non-traditional corner of engineering. In the mainstream of science and engineering, the cost of research and education is now beyond our range and has become the responsibility of government, industry, and the institutions themselves.

In applied mathematics, our activities expanded in 1983 after a considerable period of exploration and planning. Ours is still a program of modest size, but we believe it meets an important need not addressed by federal agencies or other foundations. The grants made in applied mathematics are often complementary to those made in our New Liberal Arts Program and will produce instructional materials that are useful in that program.

Trustee Grants in Applied Mathematics

An Experimental Curriculum

$240,000 over three years

The cornerstone of education in mathematics has traditionally been calculus — the study of continuous changes — and calculus is still the standard freshman mathematics course in American colleges and universities. Over the last 10 years, however, the dominance of calculus has come under increasing criticism as interest has grown in "discrete" mathematics — the study of discontinuous changes such as the yes-no decisions inside a computer. The relative merits of continuous and discrete are now widely debated among mathematicians and other educators, many of whom believe that the most useful and important kind of mathematics for students majoring in such fields as computer science, management, engineering, and the social sciences is discrete mathematics. So far the debate has produced plans and proposals for change but little in the way of a curriculum.

To stimulate some experimental work, the Foundation last year invited 30 institutions of higher education to compete for grants up to $40,000 for the development of a new two-year, freshman-sophomore curriculum in which discrete mathematics would rival calculus. We had reason to believe there was a more than passing interest at these 30 institutions in such a curriculum. Their proposals indicated that their mathematics departments had no objections to introducing discrete mathematics during the first two years, but many wanted merely to increase the time devoted to mathematics rather than reduce the time devoted to calculus. Thus it was evident that mathematicians as a professional group had not yet adequately confronted the issue and found a consensus concerning the place of discrete mathematics in the undergraduate curriculum. All proposals were evaluated with the help of an outside advisory committee consisting of:

Anthony Ralston, Professor of Computer Science, State University of New York, Buffalo, chairman of the committee

Donald Bushaw, Professor of Mathematics, Washington State University

Alan Tucker, Professor of Applied Mathematics & Statistics, State University of New York, Stony Brook

Gail Young, Professor of Mathematics, University of Wyoming

As a result of this evaluation, grants of $40,000 each were made to six institutions. Their projects vary in scope and many details, but their common aim is the development of a two-year sequence of courses in discrete mathematics. The six grantees were:

Colby College
Waterville, Maine 04901
(Project director: Donald Small, Associate Professor of Mathematics.)

Florida State University
Tallahassee, Florida 32306
(Project director: John L. Bryant, Chairman, Department of Mathematics and Computer Science.)

Montclair State College
Upper Montclair, New Jersey 07043
(Project director: Kenneth Kalmanson, Professor of Mathematics.)

St. Olaf College
Northfield, Minnesota 55057
(Project director: Loren C. Larson, Professor of Mathematics.)

University of Delaware
Newark, Delaware 19711
(Project director: Ronald E. Baker, Associate Professor of Mathematical Sciences.)

University of Denver
Denver, Colorado 80208
(Project directors: Ronald E. Prather and Herbert J. Greenberg, Professors of Mathematics.)

Other Trustee Grants in Applied Mathematics

New York University **$300,000**
70 Washington Square South (over three years)
New York, New York 10012

The Foundation has had the pleasure of providing substantial support in the past to the Courant Institute of Mathematical Sciences at New York University. With the help of this grant, the Institute, a leading center for research in applied mathematics, will turn its attention to robotics, a field rich with problems that have been neglected by mathematicians. Mathematical contributions to computer science have focused mainly on internal representations in the computer; for example, how information can be linked in a computer's memory so that computations can be done efficiently. Robotics expands the scope of mathematics applied to computer science to include external objects — the robot and its environment — and confronts mathematicians with new and challenging problems. When mathematicians involve themselves in such applications, there is always the chance they will confine themselves to those parts of the problem they can solve completely and elegantly instead of solving what needs to be solved; but the record suggests that Courant may be particularly effective in leading mathematicians into such a new area as robotics. (Project director: Jacob T. Schwartz, Director, Computer Science Division.)

Clarkson College **$216,000**
Potsdam, New York 13676 (over two years)

The Foundation made a grant of $23,000 to Clarkson in 1981 for a conference on the feasibility of training mathematicians in computer science to enable them to teach introductory and possibly advanced courses in computing. Staffing such courses with adequately trained instructors is a problem that bedevils colleges and smaller institutions of higher education. One solution seems to lie within the institution and its own faculty: if instead of trying to compete in the academic marketplace for scarce and high-priced computer scientists, a college could train members of its existing faculty to handle the swollen enrollments in computing courses, a permanent and affordable solution could be effected. The conference examined a number of training models and gave its strongest support to the one financed by this grant: a program under which 30 faculty members with doctorates in mathematics will be trained in workshops at Clarkson over two summers, with an intervening year of work done on their home campuses. (Project director: Edward Dubinsky, Professor of Mathematics and Computer Science.)

Consortium for Mathematics and Its Applications (COMAP) **$122,000**
271 Lincoln Street (over two years)
Lexington, Massachusetts 02173

The development and dissemination of instructional materials in applied mathematics is the main concern of this young organization, which has produced some hundreds of mathematical modules that cut across many academic disciplines. Last year COMAP won a large award in the Annenberg/Corporation-for-Public-Broadcasting competition for video-based, full-length college courses. That grant together with further support from the Carnegie Corporation will enable COMAP to produce a new and innovative television series that will constitute an introductory course in mathematics for liberal arts students, both on campus and off. In the past, introductory courses in mathematics for students not majoring in a quantitative field have been either of the "math for poets" variety or have offered pre-computer versions of discrete mathematics applied to social science or other fields. COMAP hopes to produce a different kind of course that will give students some sense of the aesthetic wonder of mathematics and some insight into the newest applications that the computer age makes possible. Neither the Annenberg/CPB nor the Carnegie grant, however, covers a vital aspect of the project: the cost of preparing a textbook and other written materials to accompany the video programming. The Sloan grant will cover these essential costs and help in the production of an innovative textbook able to stand alone or be used with the video programming. (Project director: Solomon A. Garfunkel, Executive Director of COMAP.)

Brookings Institution **$330,000**
1775 Massachusetts Avenue, N. W. (over two years)
Washington, D.C. 20036

Discussions between the Foundation and the Brookings Institution in 1981 resulted in the establishment of a Science Policy Fellowships program at Brookings. This program makes it possible for a few senior scientists and engineers to spend a year in Washington and contribute their expertise to the public policy studies being conducted at Brookings and pursue their own studies related to policy formation at the national level. Three fellows a year have been selected over the last two years from the fields of physics, medicine, genetics, geochemistry, and engineering. They have interacted effectively with the economists and social scientists at Brookings, and have at the same time explored many public policy questions relating to their own discipline. The Foundation's arrangement with Brookings called for the Science Policy Fellowships to be undertaken as an experiment for a three-year period, at the end of which the program would be evaluated and decisions made as to its continuation. This grant will meet the costs of the third year. (Project director: Bruce K. MacLaury, President of Brookings.)

American Academy of Arts and Sciences **$300,000**
Norton's Woods, 136 Irving Street (over two years)
Cambridge, Massachusetts 02138

The International Institute for Applied Systems Analysis (IIASA), located near Vienna, is an applied science organization established 10 years ago. The United States first proposed its creation and has been an active member from the beginning. IIASA brings together scholars and practitioners from many backgrounds and countries for a unified attack on such global problems as energy supply, environmental management, urbanization, population, aging, regional planning, and food supply. Participation by the United States has been through the National Academy of Sciences and financed by the National Science Foundation, which withdrew its support last year. The American Academy of Arts and Sciences, believing that continued participation by the United States is important, has assumed the U.S. membership in IIASA and has undertaken to raise $2 million to meet the costs of membership over the next two years. This grant is the Foundation's contribution to that budget. (Project director: John Voss, Executive Officer of the American Academy of Arts and Sciences.)

University of Delaware **$135,000**
Newark, Delaware 19711 (over three years)

The Foundation made a grant of $20,000 to the University of Delaware in 1982 for partial support of a summer institute in theoretical physics under the aegis of the university's marine complex at Lewes, Delaware. Institutes of this sort are of special importance in such fields as theoretical physics and pure mathematics, where discussions among scholars are the most efficient mode of communication and where the high degree of specialization makes discussion difficult within a single institution or even a group of neighboring institutions. Several institutes to serve this purpose are well established in Europe and one, at Aspen, in the United States; but the eastern portion of the country has had no institute until the one at Lewes. This grant will meet part of the expenses of the Lewes institute for three years. (Project director: Arthur Halprin, Professor of Physics.)

Sigma Xi **$70,000**
345 Whitney Avenue (over two years)
New Haven, Connecticut 06511

In 1986 Sigma Xi will begin its second century as one of the nation's leading scientific honor societies. To mark its centennial, the society will sponsor a review of the past century's progress in science and a speculative discussion of the future. Six special issues of the society's journal, *American Scientist*, will be devoted to this purpose in 1986. These issues will attempt an extremely difficult job: each article will deal with a single science but in the context of other sciences rather than purely on its own terms. Thus a retrospective issue dealing with physics might explore the manner in which physical research and the development of powerful concepts within physics have affected other sciences such as chemistry, biology, psychology, and astronomy. For other sciences, the treatment of neighboring disciplines may run in the opposite direction: a review of archeology, for example, may treat the flow of knowledge that has been generated in other sciences and put to use in archeology. Sigma Xi has given itself a task as complex as it is unorthodox, but if it succeeds, these issues of its journal will be an important contribution to scientific discussion. (Project director: Caryl P. Haskins, Chairman of Sigma Xi.)

Harvard University **$50,000**
Cambridge, Massachusetts 02138 (over three years)

Ernst Mayr is one of the principal architects of modern evolutionary theory. Some of the most important work of this prolific biologist has been his effort to clarify the conceptual underpinnings of evolutionary biology. While at work on

a recently published history of biology, Professor Mayr "became painfully aware," as he puts it, "of the great vagueness and intellectual confusion concerning most major concepts of biology." Sloan's grant will help him write a book that will be a systematic treatment of the principal concepts of biology such as adaptation, species, evolution, biological isolating mechanisms, and phyletic descent. He believes such a treatment as he envisions will correct a bias in the philosophy of science that has inhibited a full understanding of biological work.

Officer Grants in Science, Technology, and Mathematics

American Council of Learned Societies — **$20,000**
800 Third Avenue — (over two years)
New York, New York 10022

Partial support for a complete edition of the correspondence of Charles Darwin. (Project director: Frederick H. Burkhardt, President Emeritus of ACLS.)

American Statistical Association — **$7,500**
806 Fifteenth Street, N.W. — (over one year)
Washington, D.C. 20005

For an independent evaluation of the Council of Professional Associations on Federal Statistics (COPAFS). (Project director: Judith W. Rowe, Director of COPAFS.)

Boston Film Video Foundation, Inc. — **$20,000**
1126 Boylston Street — (over two years)
Boston, Massachusetts 02215

Partial support for the planning phase of a 10-part television series, *The Engineers*, each part to be a profile of an outstanding practicing engineer. (Project director: Robin Bates, Executive Producer.)

Cold Spring Harbor Laboratory — **$20,000**
P.O. Box 100 — (over one year)
Cold Spring Harbor, New York 11724

Partial support for the Cold Spring Harbor Laboratory summer research program for undergraduates. (Project director: David Kurtz, Senior Staff Investigator.)

Georgia State University — **$20,000**
University Plaza — (over two years)
Atlanta, Georgia 30303

Partial support for a study of the effects of age and time on the productivity of American Scientists. (Project director: Paula Stephan, Professor of Economics.)

Mathematical Association of America — **$20,000**
1529 Eighteenth Street, N.W. — (over two years)
Washington, D.C. 20036

For the preparation of a report on the place of discrete mathematics in the first two years of the undergraduate curriculum. (Project director: Martha Siegel, Professor of Mathematics and Computer Science, Towson State University, Baltimore, Maryland 21204.)

Menlo College — **$27,000**
Menlo Park, California 94025 — (over one year)

For a workshop on the state of mathematics education in junior and community colleges. (Project director: Donald J. Albers, Professor of Mathematics and Computer Science.)

Rockefeller University — **$15,000**
1230 York Avenue — (over one year)
New York, New York 10021

Partial support for a book by Abraham Pais, Professor of Physics, on the history of ideas and experiments concerning the structure of matter during the last 100 years.

University of Alberta — **$20,000**
Edmonton, Alberta — (over two years)
Canada T6G 2J9

For the preparation by Murray S. Klamkin, Professor of Mathematics, of instructional modules in applied mathematics and problem solving.

University of Maryland **$16,000**
College Park, Maryland 20742 (over one year)

Partial support for the publication of a collected edition of the notebooks of Charles Darwin. (Project director: Sandra Herbert, Associate Professor of the History of Science.)

University of Pittsburgh **$18,000**
Pittsburgh, Pennsylvania 15260 (over one year)

For a workshop to consider the development of a new undergraduate curriculum in computer science. (Project director: Alfs Berztiss, Associate Professor of Computer Science.)

Economics and Management

We continue at Sloan to conjoin "economics and management" in our public reports and other documents, but it is a phrase of convenience not meant to suggest that we regard as one these separate but complementary fields of traditional interest to the Foundation. Last year our activities in economics research were substantial; but in management they were confined for the most part to "public management," covered in a separate section of this report. We retain the dual term for the present section of our annual report only because many of the grants reviewed below, although mainly support for research in economics, inevitably touch upon problems of management as well; but the Foundation's support of management education in either research or instruction is minimal — a reflection of the good health the management field fortunately enjoys and the availability of other funds with which its needs are met.

Trustee Grants in Economics and Management

Microeconomics Workshops
$1,275,000

In 1975 the Foundation, after a long period of planning, launched a program in support of research in applied microeconomics. The first round of grants was made for three years and was followed by renewal grants of two years. In each case the grant supported a workshop that dealt with a family of microeconomic problems and provided support for Ph.D. candidates and for associated costs. From the beginning we realized that the true consequences of the program would not be felt for some time. We expected the program to produce in its first phase several hundred Ph.D.'s, each a graduate of one of the best of our economics departments. It would be these young men and women who would move out to become faculty members in colleges and universities throughout the country, conducting significant research themselves and in turn stimulating new students of economics and new interests in microeconomics among those who would be headed for careers in industry and government.

Phase one of the program went well: it produced a rich stream of dissertations and papers; it made major contributions to the development of a systematic, coherent body of knowledge about a number of important microeconomic problems; and it trained a large number of scholars whose main research interest is in applied microeconomics. In the light of our experience in the first round of grants, the Foundation sponsored a second round that began in 1980. Grants

were made to 12 leading departments of economics during that year and the next, again with the understanding that renewals would be considered at the appropriate time. Renewal time arrived last year. After a further evaluation of the program that produced positive results, the Trustees approved renewal grants in 1983 to seven universities; other universities are due for consideration of renewals in 1984. Each of the 1983 grants was for $170,000 over two years, except the grant to Harvard (a university that was delayed in its entry to the program and is therefore not on the same timetable as the others), which was for $255,000 over three years. Following is the list of grantees and the topics that will be studied in each workshop; the project director in each case is a professor of economics:

Harvard University
Cambridge, Massachusetts 02138
Workshop on the microeconomics of the behavior of firms, with emphasis on issues of productivity and technical change, investment, taxation, and the impact of market structures on such areas of the economy. (Project director: Zvi Griliches.)

Massachusetts Institute of Technology
Cambridge, Massachusetts 02139
Workshop on the social management of private markets. (Project director: Peter Temin.)

Northwestern University
Evanston, Illinois 60201
Workshop on the dynamics of strategic behavior by firms and regulators in selected economic markets. (Project director: Marcus Alexis.)

Princeton University
Princeton, New Jersey 08540
Workshop on the effects of regulation and taxation on the private economy. (Project director: Edwin S. Mills.)

Stanford University
Stanford, California 94305
Workshop on the economics of factor markets, including the role of unions in the operation of labor markets and the influence of wages and earnings over time on employment and labor supply. (Project director: Thomas E. MaCurdy.)

University of Minnesota
Minneapolis, Minnesota 55455
Workshop on transaction cost economics focusing largely on congestion, hierarchical contracts, and organization capital. (Project director: Edward Prescott.)

University of Washington
Seattle, Washington 98195
Workshop on the regulation of natural resources. (Project director: Gardner M. Brown, Jr.)

Other Trustee Grants in Economics and Management

Brookings Institution — **$400,000**
1775 Massachusetts Avenue, N.W. — (over three years)
Washington, D.C. 20036

The Foundation made a grant of $375,000 to Brookings in 1980 to help support a new research program on government regulation. This program was one response to the rapid movement of the federal government into new areas of social regulation in the 1960's. The agenda of studies proposed by Brookings three years ago has been substantially fulfilled. Publications have included reports on specific industries such as air cargo, thrift institutions, and rail freight, as well as several integrative studies on such topics as the strategy of social regulation, the scientific basis of health and safety regulations, and quantitative risk assessment and regulation. Still other studies and publications have emanated from this dynamic research program. In the 1970's the simultaneous growth of regulation and the onset of deregulation, with government increasing its regulatory oversight in some areas of the economy and decreasing it in others, provides the student of regulation with new and challenging problems to analyze. With this renewal grant, the Brookings Research Program will undertake studies in telecommunications regulation and the effects of the A.T. & T. consent decree; air traffic regulation in the aftermath of the deregulation of domestic airlines; the television industry under the impact of new distribution technologies; and hazardous waste regulation with emphasis on the roles of different levels of government. (Project director: Robert W. Crandall, Senior Fellow.)

American Economic Association **$300,000**
1313—21st Avenue South (over three years)
Nashville, Tennessee 37317

The Foundation has been a major supporter over the years of the Summer Program in Economics for Minority Students, a program sponsored by a committee of the AEA whose special concern is with the status of minorities in the economics profession. Through this program, undergraduate students from major minority groups are recruited who wish to consider studying for an advanced degree in economics; they are offered an eight-week, graduate-level program of study at a major university. The program tries to give these students not only a stronger foundation in economics but also a taste of what graduate school is like, and at the same time tries to reveal to them a number of academic and professional options they may not have considered. In 1982 the Foundation commissioned an evaluation of the first six years of this program. In concluding his strongly affirmative report, our evaluator said: "I personally believe this program has been a real contribution to the profession and I think that all of us owe a debt of gratitude to the leaders for their dedication as well as to the instructors and others who worked with it." The program has moved from one campus to another over its lifetime and for the next three years will be housed at the University of Wisconsin, Madison. This grant will support the program for that period of time. (Project director: Rachel McCulloch, Chairman of the Department of Economics.)

Industrial Relations Counselors, Inc. **$200,000**
Box 1530 (over two years)
New York, New York 10101

The impact of robotics on employers and employees is a subject of popular and political debate and of much speculation but of few systematic studies. In cooperation with several corporations using robotics on a large scale, IRC will conduct such a study with the help of this grant. Case studies are the heart of the project and will concentrate on such questions as the effect of robots on productivity, the requirements for retraining, and the nature of industrial relations problems stemming from the introduction of robots. (Project director: Richard A. Beaumont, Director of Research).

University of Illinois, Urbana-Champaign **$150,000**
P.O. Box 4348 (over two years)
Chicago, Illinois 60680

The Foundation has made several grants in recent years dealing with the impact of immigration on labor markets in the United States. The grant reported immediately below to the University of California, San Diego, is complementary to this grant that supports a labor economist at the Chicago campus of the University of Illinois. The California grant is financing a field study of illegal immigration in three major labor markets in California. The Illinois study will be based on a sample of Chicago establishments identified through the Immigration and Naturalization Service Report of Deportable Aliens. The value of these studies will be enhanced if the findings, set forth by different investigators working in different parts of the country, confirm each other. (Project director: Barry R. Chiswick, Professor of Economics, University of Illinois, Chicago.)

University of California, San Diego **$126,000**
LaJolla, California 92093 (over two years)

The Center for U.S. – Mexican Studies at this university has already begun a major field study of the way in which Mexican labor, documented and undocumented, has been utilized by American employers in recent decades. Special attention is given the effects of various government policies aimed at curtailing the use of illegal workers. Detailed interviews are carried out with employers, union representatives, and workers in 150 firms in California, mainly in the Los Angeles and San Diego labor markets. This grant will meet part of the cost of the project over the next two years. (Project director: Wayne A. Cornelius, Director of the Center.)

Rand Corporation **$120,000**
1700 Main Street (over three years)
Santa Monica, California 90406

One of the changes brought about by the breaking up of the Bell Telephone System is the dissolution of a strong economics research group at Bell Laboratories; and as a consequence of this change, Bell Labs will no longer publish *The Bell Journal of Economics*. This well-known and respected publication has been an important outlet for research on the economics of industrial organization and on the economics of regulation and deregulation. The Rand Corporation has agreed to take over the journal and will publish it under another name. This grant will help support the journal for the next three years, during which time it may be able to achieve self-support. (Project director: David W. Lyon, Vice President of Rand.)

Committee for Economic Development — **$75,000**
477 Madison Avenue — (over two years)
New York, New York 10022

In the opinion of many economists and other individuals from all parts of the political spectrum, a more disciplined fiscal policy than the country has had for some years is essential to a strong and stable American economy; and the key to such a policy is an appropriate tax structure. Much of the current discussion of this issue centers on a system that taxes consumption more heavily than savings. Although a good deal of research has been done both in the United States and abroad on various types of consumption taxes and their effects, a formidable gap remains between the results of this research and the practical understanding that must be achieved by the public and by policy makers to produce a reformed tax structure. With this grant CED will try to fill the gap with a study to be done by David F. Bradford, one of the country's most distinguished tax experts. He will seek to provide a perspective on tax objectives, synthesize relevant research, and illuminate the policy alternatives for such a fundamental change in the tax system. This method of summarizing and clarifying important public issues has been successfully tested in other areas by CED in recent years.

Officer Grants in Economics and Management

American Economic Association — **$5,200**
1313—21st Avenue South — (over one year)
Nashville, Tennessee 37212

Partial support for a Keynes-Schumpeter-Marx Centenary session at the 1983 annual meeting of the AEA. (Project director: Charles L. Schultze, President of the Association.)

Boston University — **$10,000**
Boston, Massachusetts 02215 — (over one year)

Partial support for a conference on Caribbean economic history. (Project director: Barbara L. Solow, Professor of Economics.)

Brookings Institution — **$15,000**
1775 Massachusetts Avenue, N.W. — (over one year)
Washington, D.C. 20036

For a conference on economic problems, prospects, and policies of industrial countries. (Project director: Bruce MacLaury, President of Brookings.)

Business and Management Foundation of Maryland, Inc. — **$10,000**
University of Maryland — (over one year)
College Park, Maryland 10742

Partial support for a conference on the social security system, to be jointly conducted by the university's Center for Business and Public Policy and its Consumer Interest Research Institute. (Project director: Lee E. Preston, Professor of Business Management.)

Council on Library Resources — **$20,000**
1785 Massachusetts Avenue, N.W. — (over two years)
Washington, D.C. 20036

Partial support for a project on the preservation, management, and accessibility of government records, with emphasis on new technologies for the storage and retrieval of information. (Project director: Warren J. Haas, President of CLR.)

Educational Broadcasting Corporation — **$20,000**
356 West 58th Street — (over one year)
New York, New York 10019

Partial support for the planning phase of a television series at WNET/13 called *Monday Morning with Adam Smith*. (Project director: Willoughby Newton, Director of Institutional Development, WNET/13.)

Hoover Institution on War, Revolution and Peace — **$20,000**
Stanford, California 94305 — (over one year)

For a research project on distribution of income before and after taxes. (Project director: Joseph A. Pechman, on leave from the Brookings Institution.)

Massachusetts Institute of Technology **$17,500**
Cambridge, Massachusetts 02139 (over one year)

For a theoretical study in population biology, sociobiology, and demography. (Project director: Paul A. Samuelson, Institute Professor; and Joel Yellin, Senior Research Scientist.)

Massachusetts Institute of Technology **$7,500**
Cambridge, Massachusetts 02139 (over one year)

For a theoretical study of the different ways of modeling intertemporal issues in general equilibrium models. (Project director: Timothy J. Kehoe, Professor of Economics.)

Northwestern University **$20,000**
Evanston, Illinois 60201 (over one year)

Partial support for completion of a book concerned with the measurement of prices, output, and productivity, being done under the direction of Robert J. Gordon, Professor of Economics.

Princeton University **$17,500**
Princeton, New Jersey, 08544 (over one year)

For a research project on the centrally planned economies of Eastern Europe. (Project director: Richard Quandt, Professor of Economics.)

United Nations Association of the U.S.A. **$20,000**
300 East 42nd Street (over one year)
New York, New York 10017

For a research project of the Economic Policy Council Panel on the global effects of the monetary and fiscal policies of the United States. (Project director: Sylvia Ann Hewlett, Executive Director of the Economic Policy Council.)

University of New Hampshire **$20,000**
Durham, New Hampshire 03824 (over one year)

Partial support for a study of the history of employee ownership in the United States. (Project director: Michael A. Conte, Professor of Economics.)

University of Texas, Austin **$20,000**
Austin, Texas 78712 (over one year)

Partial support for a research project by W. W. Rostow, Rex G. Baker, Jr., Professor of Political Economy, titled "Ideas and Action," and concerned with the intellectual origin of ideas and the implementation of government policy.

Yale University **$20,000**
New Haven, Connecticut 06520 (over one year)

For a study of the American economy from 1947-1982 that uses the National Income Accounts as an analytical framework. (Project director: Richard Ruggles, Professor of Economics.)

Education and Research in Public Policy

Support for education and research in public policy—a field often referred to under other names such as public management or education for the public service—has been a major activity of the Foundation for the last eight years. In the earlier years of the program, our support helped establish a number of new degree programs at the graduate level and a number of course sequences at the undergraduate level. In 1981, we began to turn our attention to two new sets of needs in the public policy field: research and minorities. It seemed to us by that time that an adequate variety of degree programs and experimental curricula had been established. What was then needed was the development of a strong base of research upon which instruction in public policy could stand, and the development of a systematic effort to increase the flow of minority students into these high-quality courses of study.

For the last three years most of our grants in public policy have been aimed at these two goals, and most of our expenditures last year went to the minorities part of the program. The Foundation was again assisted in its public policy program, as we have been in previous years, by the Association for Public Policy Analysis and Management (APPAM), an organization made up of leading institutions and individuals in the field of public policy education.

Trustee Grants for Minority Students in Public Policy
$1,705,000

Seven APPAM Post-Junior Year Summer Institutes	**$630,000** (over one year)
Two APPAM Post-Senior Year Summer Institutes	**$266,000** (over one year)

In 1983 the Foundation provided its fourth year of support under the program for minorities jointly developed by APPAM and the Foundation. The goal of this program is to increase the number of minorities in positions of authority in government, especially state and local government. To facilitate the movement of promising minority students into the new, rigorous public policy courses of study, APPAM provides them with extra academic support and counseling as

undergraduates. This support comes mainly through an intensive eight-week summer residential institute where instruction is concentrated in economics, applied mathematics, and communication skills. The student attends the institute between his junior and senior college years, and may attend another, higher-level institute in the summer after his undergraduate degree and before enrolling in an APPAM graduate school. The Foundation supported seven post-junior year institutes last year, each at $86,000, at the following APPAM schools:

Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213
(Project director: Brian J. L. Berry, Dean of the School of Urban and Public Affairs.)

Research Foundation of the State University of New York, Stony Brook
Stony Brook, New York 11794
(Project director: Thomas Sexton, Assistant Professor of Policy Analysis and Public Management.)

University of California, Berkeley
Berkeley, California 94720
(Project director: Allan P. Sindler, Dean of the Graduate School of Public Policy.)

University of Michigan
Ann Arbor, Michigan 48109
(Project director: Edward M. Gramlich, Director of the Institute of Public Policy Studies.)

University of Minnesota
Minneapolis, Minnesota 55455
(Project director: John Brandl, Professor of Public Affairs and Planning.)

University of Texas, Austin
Austin, Texas 78712
(Project director: Richard Schott, Professor of Public Administration.)

University of Washington
Seattle, Washington 98195
(Project director: Eric Wolters, Associate Dean of the Graduate School of Public Affairs.)

The two post-senior year institutes last year were conducted in the same mode as the post-junior year institutes. They lasted the same period of time and covered the same subjects, but with instruction at a more advanced level. The post-senior year institutes were restricted, as in previous years, to selected students who had successfully completed one of the post-junior year institutes and had been accepted by an APPAM school for enrollment in a graduate program in the fall of 1983. APPAM students now in graduate school were surveyed last year and were emphatic in crediting the summer institutes, the post-senior year institutes in particular, with making it possible for them to compete in graduate programs that are academically strenuous. The two post-senior year institutes last year took place at Harvard where 52 minority students were enrolled at a cost of $184,000, and at the Rand Corporation, where 17 were enrolled at a cost of $91,000:

Harvard University
Cambridge, Massachusetts 02138
(Project director: Avis C. Vidal, Assistant Professor of City and Regional Planning.)

Rand Graduate Institute
1700 Main Street
Santa Monica, California 90406
(Project director: Charles Wolf, Jr., Dean of the Rand Graduate Institute.)

Graduate Fellowship Support for Minority Students

Carnegie-Mellon University — **$800,000**
Pittsburgh, Pennsylvania 15213 — (over one year)

The third component of the Foundation's program for minorities in public policy is fellowship support for those students who successfully complete one of the post-senior year institutes and gain admission to an APPAM graduate program. Our support covers their first-year costs, after which they are expected to finance their second year in the same manner as do other students at the institutions they are attending. Last year's expenditure was a sharp increase over the previous year's, as the previous year's had been over the year before that — an indication of the program's effectiveness. The grant last year financed 70 students, an increase from 49 the previous year; 60 percent of the 1983 group were Black, 35 percent Hispanic, and five percent Asian-American; 45 percent were women. The 1983 grant was administered by Carnegie-Mellon on behalf of 18 APPAM schools. (Project director: Otto A. Davis, University Professor of Economics and Public Policy.)

An internal appropriation of $28,000 was approved by the Sloan Trustees in 1983 to meet the costs of a coordinating office at the Foundation devoted to the minorities program in public policy.

Other Trustee Grants in Public Policy

Cornell University — **$200,000**
Ithaca, New York 14853 — (over two years)

New York City has done notable work in recent years in the mid-career education and training of its managerial staff. It has done less with the public-sector unions of the City. This grant will help the New York State School of Industrial and Labor Relations start a training program for officials of public-sector unions in the New York City area. The curriculum will emphasize such subjects as public finance, regional economics, and problems of municipal government. The program has the strong support of union leaders in the area, and a number of unions will help meet the costs of the program by paying tuition charges for members who participate. (Project director: Lois S. Gray, Associate Dean of the Industrial and Labor Relations Extension Division.)

Rand Corporation — **$200,000**
1700 Main Street — (over two years)
Santa Monica, California 90406

The development of a body of research in public policy is essential to the well-being of this new, interdisciplinary field. The Foundation has made research grants in the last few years to such leading public policy schools as those at

Harvard, Duke, Michigan, and Berkeley. This grant will support a research project at the Rand Graduate Institute on a question that has vexed both industry and government for many years: which public services might be provided better and more cheaply by the private sector than by government? The project will also examine the collateral question of which government services might better be assigned to a different level of government from the one now providing them. (Project director: Charles Wolf, Jr., Dean of the Rand Graduate Institute.)

Carleton College **$80,000**
Northfield, Minnesota 55057 (over two years)

In 1980 the Foundation made a grant to Carleton of $236,000 for the development of an instructional program in public policy. This was one of a series of grants to liberal arts colleges for undergraduate courses intended to be part of the liberal education of students enrolled in them, not pre-professional preparation for careers in government. With its strong tradition in science and technology, Carleton established a sequence of public policy courses in such subjects as energy policy, health policy, environmental policy, and science and government. This concentration of courses was developed by political scientists, economists, and physical scientists, and has proven popular with students. The present grant represents renewal and final support for the public policy program. (Project director: Norman J. Vig, Professor of Political Science and Director of the Science, Technology and Public Policy Program.)

Harvard University **$75,000**
Cambridge, Massachusetts 02138 (over one year)

In American politics the transition process between national administrations is a public policy matter of great consequence. It is an extraordinary, almost unique, process: in a period of perhaps 12 weeks, new people take over most of the highest-level executive offices of the federal government. It is imperative that the transition process be so managed, especially in foreign policy and defense, that the incoming administration takes charge quickly and knowledgeably. In recent transitions the newly elected President and his aides have been assisted by the Institute of Politics at Harvard's Kennedy School of Government. The process itself, however, has not been analyzed; this grant will support the completion of a history of past presidential transitions being done at the Institute of Politics. (Project director: Ernest R. May, Charles Warren Professor of American History.)

New York University **$10,000**
70 Washington Square (over one year)
New York, New York 10012

For a conference on research in public policy, sponsored jointly by the university's Urban Research Center and by the Center for the Study of Business and Government at Baruch College. (Project director: Dick Netzer, Director of the Urban Research Center.)

Research Foundation of the City University of New York **$10,000**
New York, New York 10036 (over one year)

For a conference on research in public policy, sponsored jointly by the Center for the Study of Business and Government at Baruch College and the Urban Research Center of New York University. (Project director: Harold Hochman, Professor of Economics at Baruch College.)

Other Grants and Activities

In this section we review grants and activities that are related to the main interests of the Foundation but for one reason or another stand apart from a specific program or from our support of work in particular academic fields.

Experiments in Video History

Last year was the third year of our development work in what we call video history. We use that term to signify the use of video technology to extend and enrich our national memory; to capture the recollections of individuals who were involved in events or enterprises of importance to the country and the world. The technique we use may suggest a video version of oral history, but that impression would be misleading if understandable. In video history as we have experimented with it, individuals are convened in small, informal groups to reminisce, explain, gossip, contradict and complement one another's experiences, and generally compare notes concerning the incident or activity in which they were involved. Such a simple description of the technique does not convey its power; the fact is that this kind of video history frequently produces new and informative material for the scholar, politician, teacher, student, and layman with a serious interest in public affairs.

Video technology now permits taping in the ambience of an ordinary living room; lapel microphones are used and room lighting is sufficient; no one is "made up"; there is no set design; no stage director; no cueing or prompting. Four cameras, which would have been extravagantly expensive at an earlier stage in video technology, run continuously. A moderator thoroughly familiar with the subject matter is present but is mostly a facilitator of the conversation rather than a guide or goad. Because candor is encouraged, those who participate in these experiments, which often touch on sensitive subjects, are assured of their right to have any passage deleted or embargoed. To date no one has exercised that right.

The Foundation first tested the concept of video history in a taping session at M.I.T. in 1981 in which a dozen scientists, engineers, and economists took part in groups of four or five. The participants had been members of a team that conducted Project Charles, a study that was organized early in 1950 when it was learned that the Soviet Union had detonated a nuclear device the previous summer. Project Charles led to the establishment of Lincoln Laboratory and the development of the air defense system of the 1950's. Encouraged by this first experiment, the Foundation moved on to a second in 1982, this one dealing with the decision by President Truman in 1950 to accelerate the development of the hydrogen bomb.

These two tapings were shown to historians, political scientists, and other scholars, particularly at the Kennedy School of Government at Harvard, where they met with general approval and helpful criticism. We were assured that such material would be valuable in an educational setting where it could be used selectively by instructors and students as a unique resource complementing textbooks and other more customary materials. This response led the Foundation to a further experiment last year, as well as to the making of several grants for the support of video history activities outside the Foundation. The project we conducted ourselves, with two internal appropriations totaling $45,000, concerned the Cuban Missile Crisis of 1962 and the deliberations of President Kennedy's special Executive Committee that met daily throughout that unprecedented crisis. Three taping sessions were held at different times in the year, moderated by Richard E. Neustadt, Littauer Professor of Public Administration at Harvard, who had also been a consultant to President Kennedy. Among those taking part were McGeorge Bundy, Dean Rusk, George W. Ball, U. Alexis Johnson, Robert S. McNamara, Maxwell D. Taylor, Edwin M. Martin, and Donald M. Wilson. We were again encouraged by the good opinion that numerous scholars and the participants themselves had of these tapings and of the technique of video history; and we will continue our experiments next year. In 1983 the following grants were made to external organizations for experiments of their own in video history:

Brandeis University **$50,000**
Waltham, Massachusetts 02255 (over one year)

This grant will finance a taping of the recollections and experiences of I. I. Rabi, physicist and Nobel laureate, and those of his collaborators in such projects as the Radiation Laboratory at M.I.T. during World War Two; the AEC's General Advisory Committee; the Atoms for Peace proposal; the President's Science Advisory Committee; and the many other activities in which I. I. Rabi has involved himself throughout a long and distinguished career. (Project director: Jack Goldstein, Professor of Astrophysics.)

Tufts University **$50,000**
Medford, Massachusetts 02155 (over one year)

This grant, like that to Brandeis, will support an experiment in extending the scope of video history. Through the auspices of the Fletcher School of Law and Diplomacy, the six living former Secretaries of State, and possibly the present incumbent, will be brought together to discuss their respective experiences. In office they faced many of the same problems: dampening tensions between the Soviet Union and China and the Soviet Union and the United States; maintain-

ing a sense of unity in the NATO alliance; attempting to control the proliferation of nuclear weapons; and grappling with a plenitude of other global issues. Together these Secretaries possess a continuous memory of more than two decades of modern American diplomatic history, and a discussion of their experiences should provide a valuable test of video history in a new dimension that is not centered on a single crisis or situation but on one of the nation's highest offices. (Project director: Theodore L. Eliot, Dean of the Fletcher School.)

Connecticut Educational Telecommunications Corporation **$20,000**
Hartford, Connecticut 06106 (over one year)

This grant, made by the Sloan Trustees in 1983 as part of a package of smaller grants, will finance a documentary on the Cuban Missile Crisis for broadcasting over the Public Television network and built around the Foundation's video history tapes. (Project director: Sharon Blair, Vice President for Programming of CETC.)

The Sloan Book Program

From its beginning in 1976, the Sloan Book Program has sought to deepen the public's understanding of science and scholarship as a human and intellectual enterprise. We have sought out distinguished, articulate authors to set down an account of their own lives in their own way. The literary genre that seems to have developed in this series may not have a claim to uniqueness, but it is an unusual blend of discursive exposition, remembrance of things past and personal, explorations of public policy, sketches of people the author has known, childhood reminiscences, advice implicit and explicit and based on much experience; and above all it is a mode of autobiography that offers the reader insights into the labor and joy of intense intellectual endeavor pursued in the midst of an active and often public life. Five books have been published in the Sloan Book Program so far:

Jerome Bruner, *In Search of Mind*
Hendrik Casimir, *Haphazard Reality*
Freeman Dyson, *Disturbing the Universe*
Sir Peter Medawar, *Advice to a Young Scientist*
Lewis Thomas, *The Youngest Science*

Early in 1984, Salvador Luria, Nobel laureate and biologist, will join the list with his book, *A Slot Machine, a Broken Test Tube*. Other authors in the series whose manuscripts are in various stages of preparation are: Luis Alvarez, Nobel

laureate and physicist; Francis Crick, Nobel laureate and biologist; Dorothy Hodgkin, Nobel laureate and chemical crystallographer; Mark Kac, mathematician; Frederick Mosteller, statistician; William Pickering, physicist and electrical engineer; John Rigden, physicist who is working in collaboration with I. I. Rabi, Nobel laureate and physicist; Gian-Carlo Rota, mathematician; Paul Samuelson, Nobel laureate and economist; Victor Weisskopf, physicist; Robert Wilson, physicist; and Jerrold Zacharias, physicist.

The Foundation is assisted in the Sloan Book Program by a committee of the following persons:

Robert Sinsheimer, Chancellor of the University of California, Santa Cruz, chairman of the committee

Michael Bessie, Publisher, Cornelia & Michael Bessie Books

Edward Burlingame, Vice President and Publisher, Harper and Row

Howard Hiatt, Dean of the Harvard School of Public Health

Mark Kac, Professor of Mathematics, University of Southern California

Eric Kandel, University Professor of Physiology and Psychology, Columbia University

Daniel Kevles, Professor of History, California Institute of Technology

Robert Merton, University Professor Emeritus and Special Service Professor, Columbia University

Paul Samuelson, Institute Professor of Economics, Massachusetts Institute of Technology

Stephen White, foundation officer (retired), writer

The Sloan Book Program began as a program concerned with the so-called hard sciences and with the lives of eminent scientists, but was enlarged in later years to include a few other fields. The Foundation has every reason to be pleased with the books that have appeared to date, which have been received with praise by reviewers and the public, and we look forward with pleasure to the books that will appear in the future.

Additional grants for miscellaneous purposes are reviewed alphabetically below in two sections: those made by the Trustees of the Foundation and those made by the officers.

Trustee Grants for Miscellaneous Purposes

Carnegie-Mellon University **$500,000**
Pittsburgh, Pennsylvania 15213 (over three years)

One of the greatest benefits of cheap and powerful microcomputers in higher education is the elimination of restrictions that inhere in time-shared systems, such as limited access for students to terminals, slow response time when the system is in heavy use, and time lost for all users when time-shared systems go down. But the microcomputer revolution is not without its problems, one of which is the lack of compatibility in operating systems and languages among the plethora of machines now available. A degree of anarchy may be inevitable and even desirable, but the need for standardization is also recognized in colleges and universities. Central planning in some form is particularly important at those institutions that have committed themselves to universal computing—to the provision of networked microcomputers, on campus and at home, for virtually everyone in the institution. Carnegie-Mellon, a leading university in academic computing, has embarked on an ambitious development project jointly with IBM. Their purpose is to build the prototype of a complete, integrated, distributed processing computing system based on a new machine, a 32-bit processor capable of executing up to two million instructions per second. The project aims to create a saturated computer environment that will allow every student, faculty member, and staff member unlimited access to full-service, state-of-art computing. Part of the university's responsibility is to develop programming and instructional applications commensurate with such a comprehensive hardware system. This grant will meet about half the costs of an Educational Software Development Group that will supervise the development of a large number of computer applications across the liberal arts curriculum. (Project director: John P. Crecine, Professor of Political Economy and Senior Vice President for Academic Affairs.)

Dartmouth College **$250,000**
Hanover, New Hampshire 03755 (over two years)

This grant complements the one to Carnegie-Mellon and is another in our efforts to help educators fill the software vacuum in microcomputing and help institutions move into a new computing era. When John Kemeny and his colleagues

developed the BASIC language 20 years ago, they succeeded beyond anything they could have imagined in creating an easy-to-use, all-purpose language applicable to many academic subjects and instructional purposes. In one or another of its variations, and they are legion, BASIC is available on almost every microcomputer now manufactured; it is either built into the read-only memory of the machine or otherwise provided free by the manufacturer. Faster and better languages have been developed but BASIC continues to be the most widely available language and to have the largest following. It has been improved at Dartmouth, where many applications are now programmed in "structured" BASIC, a form of the language that imposes more orderly and disciplined thought than unstructured forms. Structured BASIC is used, however, only on the Dartmouth time-shared system. With the help of this grant, a number of faculty members and students at Dartmouth will convert materials now restricted to the time-shared system to a new form of structured BASIC for microprocessors. (Project director: C. Dwight Lahr, Associate Dean of the Faculty, Science Division.)

Massachusetts Institute of Technology **$131,000**
Cambridge, Massachusetts 02139 (over one year)

Among the grants reviewed in the first section of our report this year was one to M.I.T. for a summer workshop on the technology of nuclear weapons and arms control. Closely linked to that workshop was this further grant to M.I.T. for an experiment in television technology. It was in effect a planning grant to allow several collaborating institutions, led by M.I.T., to develop a proposal for a television-based course of study on nuclear weapons. To do so required them to videotape the entire arms control workshop, to screen and make use of other existing television materials, and to produce short segments of new materials themselves. Their intention was to test the uses of television technology, and to present a body of analysis on urgent policy questions of nuclear weapons and arms control free of prejudgments and bias. This complex undertaking is still going forward with the guidance of an advisory committee. (Project director: Carl Kaysen, Director of the M.I.T. Program in Science, Technology, and Society.)

New York University **$116,500**
70 Washington Square South (over two years)
New York, New York 10012

Each year the Foundation makes a major "civic" grant and one or more smaller grants to educational institutions or social-service agencies in New York City in recognition of our obligations as a corporate citizen. Such grants are often related

to the regular programs and interests of the Foundation but that relationship is not obligatory. This grant will finance a study by the Urban Research Center at N.Y.U. of recent trends in population and housing in New York City. Special attention will be given the problems of the elderly in the City's housing market; the movement of immigrants to the outer boroughs of the City; and the effects of "gentrification" on the housing market in Manhattan. These issues and topics are not unique to New York City but they have a special character and intensity in that particular environment and raise public policy questions of fundamental importance. (Project director: Michelle White, Professor of Economics.)

Vanderbilt University **$400,000**
Nashville, Tennessee 37212 (over one year)

In our annual report for 1980 we announced a large-scale, long-term study of the system by which Presidents of the United States are selected, and we went into some detail concerning its structure and rationale. The study is being conducted by Alexander Heard, Chancellor Emeritus of Vanderbilt. A long period of preparation was necessary before this project could get fully under way, which it did last year. An extensive bibliography has now been prepared, a primer on presidential selection that recapitulates the history of the process has been written, a conference of scholars has been held, and a large number of papers have been commissioned. The Foundation made two grants to Vanderbilt in 1983 totaling $400,000 as further installments in our support of this project.

Officer Grants for Miscellaneous Purposes

American Association for the Advancement of Science **$20,000**
1776 Massachusetts Avenue, N.W. (over one year)
Washington, D.C. 20036

For a primer on problems of verification in arms control and in proposals and agreements for the reduction of arms. (Project director: Richard A. Scribner, Science and Policy Programs Manager.)

Association for the Integration of Management, Inc. **$20,000**
450 Park Avenue (over one year)
New York, New York 10022

A civic grant in partial support of a new position, Director of Development. (Project director: James S. Spain, Executive Director.)

Association of American Publishers, Inc. **$20,000**
2005 Massachusetts Avenue, N.W. (over three years)
Washington, D.C. 20036

Partial support for the development of computer codes and scholars' guidelines to increase the speed and reduce the costs of academic and literary publishing. (Project director: Carol A. Risher, Director of Copyright and New Technology.)

Association of Governing Boards of Universities and Colleges **$20,000**
One Dupont Circle (over one year)
Washington, D.C. 20036

Partial support for a study of programs that train the trustees of institutions of higher education and of other non-profit organizations. (Project director: John W. Nason, Consultant.)

Catticus Corporation **$19,240**
4560 Horton Street (over one year)
Emeryville, California 94608

For completion of the post-production phase of a film project titled, "The First Fifty Years; a Personal Perspective on U.S.-Soviet Relations," by Quest Productions, Inc. (Project director: William C. Jersey, President of Quest Productions.)

Council on Foundations, Inc. **$40,000**
1828 L Street, N.W. (over one year)
Washington, D.C. 20036

The Foundation made two grants in 1983 of $20,000 each to this organization, which is the principal national association of private foundations. One grant represented the annual membership dues of the Sloan Foundation, and the second helped the Council meet extraordinary legal expenses incurred in connection with Congressional hearings on foundations. (Project director for both grants: James A. Joseph, President of the Council.)

Harvard University **$20,000**
Cambridge, Massachusetts 02138 (over one year)

Supplementary support (to our grant of $91,000 in 1981) to allow James Q. Wilson, Henry Lee Shattuck Professor of Government, and Richard Herrnstein, Edgar Pierce Professor of Psychology, to complete their research and writing project titled, "Crime and Human Nature."

Harvard University — **$18,400**
Cambridge, Massachusetts 02138 — (over one year)

Partial support for research fellows at the Center for Science and International Affairs. (Project director: Paul Doty, Director of the Center.)

Massachusetts Institute of Technology — **$20,000**
Cambridge, Massachusetts 02139 — (over one year)

Partial support for a summer institute on quantitative methods in archaeology and ethnology. (Project director: Heather Lechtman, Director of the Center for Materials Research in Archaeology and Ethnology.)

Massachusetts Institute of Technology — **$19,000**
Cambridge, Massachusetts 02139 — (over one year)

Partial support for a post-doctoral fellowship in the Defense Policy and Arms Control Program of the Center for International Studies. (Project director: Patricia K. Greer, Assistant Director of the Office of Sponsored Programs.)

National Affairs, Inc. — **$20,000**
10 East 53rd Street — (over one year)
New York, New York 10022

For a series of articles on professional graduate schools to be published in the journal, *The Public Interest*. (Project director: Irving Kristol, Editor.)

New York Institute of Technology — **$20,000**
Old Westbury, New York 11568 — (over two years)

A civic grant made in partial support of a project concerned with the training of handicapped persons in New York City for computer-based jobs that can be done at home. (Project director: Matthew Schure, President of NYIT.)

New York Regional Association of Grantmakers, Inc. — **$11,667**
630 Fifth Avenue — (over one year)
New York, New York 10111

A grant in kind to an organization of which the Foundation is a member to cover the costs of the use of the Sloan Foundation's office space and utilities. (Project director: Barrie M. Pribyl, Executive Director of NYRAG.)

New York University — **$20,000**
70 Washington Square South — (over one year)
New York, New York 10012

Partial support for work on the first volume of a study titled, *The Morgans: Private Investment Bankers, 1854-1934*. (Project director: Vincent P. Carosso, Kenan Professor of History.)

Rutgers University Foundation — **$8,000**
191 College Avenue — (over one year)
New Brunswick, New Jersey 08903

Partial support for a conference on standardizing computer data bases in the humanities and social sciences. (Project director: Robert F. Allen, Professor of French.)

Social Science Research Council — **$6,000**
605 Third Avenue — (over one year)
New York, New York 10016

A civic grant to support a five-university project in New York City concerned with survey research. (Project director: Kenneth Prewitt, President of SSRC.)

United Way of Tri-State — **$3,500**
99 Park Avenue — (over one year)
New York, New York 10016

A civic grant made as a contribution to this organization's annual fund-raising campaign. (Project director: Calvin Green, President of the United Way of Tri-State.)

University of Pennsylvania — **$8,000**
Philadelphia, Pennsylvania 19104 — (over one year)

Emergency support for a visiting scholar from the People's Republic of China to join a research group working on the hormonal regulation of salt appetite. (Project director: Eliot Stellar, Professor of Physiology, Psychiatry, and Anatomy.)

Financial Review

Financial Review

The financial statements and schedules of the Foundation, which have been audited by Ernst & Whinney, independent certified public accountants, appear on pages 64 to 78. They include the balance sheets, the statements of income, expenses and changes in fund balance, the statements of changes in financial position, the schedules of administration and investment expenses, the schedule of investments, and the schedule of grants and appropriations.

Investment and other income for 1983 was $21,660,845, an increase of $1,138,984 from $20,521,861 in 1982. After the deduction of investment expenses and provision for Federal excise tax from investment and other income, net investment income was $20,038,833 in 1983 as compared with $19,439,841 for the prior year. Investment expenses during 1983 totaled $734,012, of which $436,882 represented investment counsel fees. Provision for Federal excise tax amounted to $888,000. The total of these deductions from income in 1983 was $1,622,012 versus $1,082,380 in 1982.

The total of grants and appropriations authorized net of grant refunds and administration expenses during 1983 was $16,804,767. This sum was $3,234,066 under 1983 net investment income. Of this total, grants and appropriations authorized amounted to $15,438,715 while administration expenses were $1,445,142. Since the Foundation's inception in 1934, the cumulative excess of grants and expenses over the Foundation's income has amounted to $46,479,271.

Grant and appropriation payments in 1983 were $16,626,893, compared with $16,720,475 the prior year. Together with administration expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures net of grant refunds in 1983 was $19,160,297, while in 1982 the amount was $19,220,347.

The market value of the Foundation's total assets was $360,842,476 at December 31, 1983, including investments valued at $360,764,296, as compared with total assets of $316,397,030 at December 31, 1982. A summary of the Foundation's investments at cost and market value at December 31, 1983 appears on page 69.

A listing of grants made during 1983 including grants and appropriations authorized and payments during the year will be found on pages 75 to 78.

Report of Ernst & Whinney Independent Auditors

Board of Trustees
Alfred P. Sloan Foundation
New York, New York

We have examined the balance sheets of the Alfred P. Sloan Foundation as of December 31, 1983 and 1982 and the related statements of income, expenses and changes in fund balance and changes in financial position for the years then ended and the supplementary schedules of investments at December 31, 1983, grants and appropriations for the year then ended and administration and investment expenses for the years ended December 31, 1983 and 1982. 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, the financial statements referred to above present fairly the financial position of the Alfred P. Sloan Foundation at December 31, 1983 and 1982, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis. Also, in our opinion, the supplementary schedules referred to above are fairly stated in all material respects in relation to the financial statements taken as a whole.

Ernst & Whinney

New York, New York
January 27, 1984

Balance Sheets

December 31, 1983 and 1982

	1983	1982
Assets		
Investments:		
Fixed income:		
U.S. Government and agency	$ 42,774,487	$ 49,195,252
Corporate and other	60,128,060	41,771,999
	102,902,547	90,967,251
Equity:		
General Motors Corporation	40,665,143	41,677,643
Other	141,746,252	119,221,818
	182,411,395	160,899,461
Total investments (market value: $360,764,296 in 1983 and $316,154,847 in 1982)	285,313,942	251,866,712
Cash	78,180	242,183
Total	$285,392,122	$252,108,895
Liabilities and Fund Balance		
Grants and appropriations unpaid	$ 15,690,571	$ 16,878,749
Federal excise tax and other liabilities	1,050,895	547,029
Fund balance	268,650,656	234,683,117
Total	$285,392,122	$252,108,895

See accompanying notes to financial statements.

Statements of Income, Expenses and Changes In Fund Balance

For the years ended December 31, 1983 and 1982

	1983	1982
Investment Income:		
Dividends	$ 10,746,530	$ 10,180,395
Interest	10,903,183	10,331,237
Other	11,132	10,229
	21,660,845	20,521,861
Less:		
Investment expenses	734,012	645,380
Provision for Federal excise tax	888,000	437,000
	1,622,012	1,082,380
Net investment income	20,038,833	19,439,481
Grants and administration expenses:		
Grants and appropriations authorized (net of grant refunds of $79,090 in 1983 and $35,358 in 1982)	15,359,625	16,031,594
Administration expenses	1,445,142	1,374,016
Total	16,804,767	17,405,610
Grants and expenses less than income for the year	3,234,066	2,033,871
Net gain on disposals of securities	28,568,621	2,255,324
Assets received as remainderman of various trusts	2,164,852	332,475
NET CHANGE IN FUND BALANCE FOR YEAR	33,967,539	4,621,670
Fund balance January 1	234,683,117	230,061,447
FUND BALANCE AT END OF YEAR	$268,650,656	$234,683,117

See accompanying notes to financial statements.

Statements of Changes in Financial Position

For the years ended December 31, 1983 and 1982

	1983	1982
SOURCE OF FUNDS		
Investment income	$21,660,845	$20,521,861
Net gain on disposals of securities	28,568,621	2,255,324
Other	2,214,058	439,657
	52,443,524	23,216,842
APPLICATION OF FUNDS		
Grant and appropriation payments (net of grant refunds of $79,090 in 1983 and $35,358 in 1982)	16,547,803	16,685,117
Administration expenses	1,445,142	1,374,016
Investment expenses	734,012	645,380
Federal excise taxes paid	433,340	515,834
	19,160,297	19,220,347
INCREASE (DECREASE) IN FUNDS CONSISTING OF		
Cost of investments	33,447,230	5,365,020
Amount due for securities sold, not delivered - - net		(1,292,036)
Cash balances	(164,003)	(76,489)
NET INCREASE	$33,283,227	$ 3,996,495

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.

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

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 $129,879 and $116,650 for 1983 and 1982, respectively.

3. LEASE

The Foundation's lease for its office space expires April 30, 1985. The lease contains an escalation clause which provides for rental increases resulting from increases in real estate taxes and certain other operating expenses. Under the lease, rent was $290,518 in 1983 and $281,973 in 1982, before sublease income.

4. FUND BALANCE

Fund balance, at year end, is comprised of the following:

	1983	1982
Principal	$315,129,927	$284,396,454
Income - - cumulative excess of grants and expenses over income from inception of the Foundation	(46,479,271)	(49,713,337)
Fund balance	$268,650,656	$234,683,117

Schedules of Administration and Investment Expenses

For the years ended December 31, 1983 and 1982

	1983	1982
ADMINISTRATION EXPENSES		
Salaries and employee benefits:		
Salaries	$ 799,997	$ 778,917
Employees' retirement plan and other benefits	264,981	221,741
Total	1,064,978	1,000,658
Rent (net of sublease rentals of approximately $44,000 and $41,000, respectively)	237,553	243,561
Program expenses	248,910	208,782
Office expenses and services	136,021	128,983
Reports and publications	21,954	28,553
Professional fees	32,856	31,863
Total administration expenses	1,742,272	1,642,400
Less administration expenses applicable to investments	297,130	268,384
Administration expenses applicable to grant making	$1,445,142	$1,374,016
INVESTMENT EXPENSES		
Investment counsel fees	$ 436,882	$ 376,996
Administration expenses applicable to investments	297,130	268,384
Total investment expenses	$ 734,012	$ 645,380

Schedule of Investments

December 31, 1983

SUMMARY	Cost	Market Amount	Market Percent of Total Investment
Fixed income:			
U.S. Government and agency	$ 42,774,487	$ 43,212,557	12.0%
Corporate and others	60,128,060	61,213,202	16.9
Total fixed income	102,902,547	104,425,759	28.9
Equity:			
General Motors Corporation	40,665,143	70,656,250	19.6
Other	141,746,252	185,682,287	51.5
Total equity	182,411,395	256,338,537	71.1
Total investments	$285,313,942	$360,764,296	100.0%

FIXED INCOME	Principal	Cost	Market
U.S. Government and agency:			
U.S. Treasury:			
15% Notes 1/31/84	$ 2,500,000	$ 2,496,905	$ 2,510,925
15¼% Notes 2/29/84	2,000,000	1,998,840	2,016,240
14⅜% Notes 2/15/85	2,000,000	1,976,250	2,088,740
14% Notes 6/30/85	1,000,000	954,844	1,045,940
13½% Notes 2/15/86	5,000,000	4,912,500	5,235,950
11% Notes 11/15/86	5,000,000	4,987,300	4,992,200
14% Notes 7/15/88	3,000,000	3,195,998	3,251,250
11¾% Notes 11/15/88	1,600,000	1,601,631	1,606,992
10¼% Notes 7/15/90	10,000,000	9,827,022	9,556,200
10⅜% Bonds 11/15/12	10,000,000	8,841,947	8,825,000
Federal National Mortgage Association:			
14¼% Debentures 3/11/85	2,000,000	1,981,250	2,083,120
Total U.S. Government and agency		42,774,487	43,212,557
Corporate and other:			
Short term:			
Interest bearing call account	7,059	7,059	7,059
Interest bearing demand notes	208,000	208,000	208,000
Commercial Paper:			
National Westminster, Ltd. 10% 6/14/84	5,000,000	4,748,611	4,776,150

Schedule of Investments

December 31, 1983
(continued)

FIXED INCOME	Principal	Cost	Market
Corporate and other (continued):			
Short term (continued):			
Prudential Funding Corporation			
11.26% 1/3/84	$ 701,000	$ 701,000	$ 701,000
Repurchase Agreements:			
10⅝% 1/3/84	9,000,000	9,000,000	9,000,000
10⅞% 1/3/84	5,000,000	5,000,000	5,000,000
Time Deposits:			
Australia & New Zealand Banking Group			
2.75% 1/5/84	100,000 (Aus. $)	89,950	89,964
Bayerische Veriensbank			
7% 1/5/84	520,000 (DM)	188,133	191,110
11¼% 1/5/84	270,000	270,000	270,169
Total short term		20,212,753	20,243,452
Long term:			
Air Products and Chemicals Corporation			
14⅛% Notes 8/1/87	1,000,000	995,000	1,069,960
American Telephone and Telegraph Company			
13¼% Notes 3/15/91	2,000,000	1,904,600	2,084,300
Chesapeake & Ohio Railway Company			
8½% Conditional Sale Agreement 1/1/89	563,335	454,055	516,859
C.I.T. Financial Corporation			
13% Notes 10/15/85	3,000,000	3,000,000	3,063,750
E.I. duPont de Nemours and Company			
14% Notes 12/1/91	3,000,000	2,915,000	3,226,860
General Foods Corporation			
7⅛% Notes 3/1/84	500,000	463,580	498,070
General Motors Acceptance Corporation			
10% Notes 7/15/85	2,000,000	2,000,000	1,968,220
12¼% Notes 10/1/87	2,000,000	2,045,762	2,016,540
14⅛% Notes 6/15/89	2,000,000	1,956,180	2,141,900
Hitachi Maxell, Ltd.			
4¼% Convertible Bonds 3/31/97	110,000	150,700	177,306
Household Finance Corporation			
10¼% Notes 12/1/87	3,500,000	3,491,250	3,382,015
International Bank for Reconstruction and Development			
14⅛% Notes 8/1/87	3,000,000	3,321,570	3,246,630
Manufacturers Hanover Corporation			
9⅛% Notes 5/1/86	3,000,000	2,923,620	2,887,560
Manufacturers Hanover Trust Company			
8½% Capital Debentures 6/1/85	1,000,000	973,440	970,460
Minebea Company, Ltd.			
5½% Convertible Bonds 9/30/98	120,000	119,700	134,550

Schedule of Investments

December 31, 1983
(continued)

FIXED INCOME	Principal	Cost	Market
Corporate and other (continued):			
Long term (continued):			
NCNB Corporation			
14½% Notes 9/1/92	$ 3,000,000	$ 3,007,500	$ 3,197,910
SCOA Industries, Inc.			
10% Convertible Subordinated Debentures 9/1/07	1,000,000	1,223,020	1,175,000
Standard Oil Company (Indiana)			
14% Notes 6/1/91	3,000,000	2,989,080	3,219,540
Standard Oil Company (Ohio)			
13⅛% Notes 9/15/92	3,000,000	2,981,250	3,127,290
Xerox Corporation			
10½% Notes 3/1/88	3,000,000	3,000,000	2,865,030
Total long term		39,915,307	40,969,750
Total corporate and other		60,128,060	61,213,202
Total fixed income		$102,902,547	$104,425,759

EQUITY	Number of Shares	Cost	Market
United States:			
Allied Corporation	65,000	$ 2,713,263	$ 3,623,750
Aluminum Company of America	95,400	3,061,293	4,281,075
American Telephone and Telegraph Company	111,000	6,414,636	6,826,500
AMF Inc.	146,600	3,010,598	2,345,600
Associated Dry Goods Corporation	40,000	1,046,352	2,345,000
Atlantic Richfield Company	60,000	2,222,666	2,595,000
Avco Corporation	111,700	3,172,182	3,546,475
Avon Products, Inc.	114,000	4,772,051	2,864,250
BankAmerica Corporation	96,200	2,082,757	2,008,175
Bio-Response, Inc.	40,000	370,000	400,000
Burlington Industries, Inc.	81,600	2,201,220	2,866,200
Champion International Corporation	122,800	3,308,760	3,545,850
Clothestime, Inc.	40,000	440,000	400,000
Colgate-Palmolive Company	53,000	909,350	1,139,500
Continental Group, Inc.	57,000	1,680,959	3,078,000
Control Data Corporation	24,400	1,055,806	1,104,100
Dart & Kraft, Inc.	48,000	2,215,320	3,198,000
Deltona Corporation	70,000	1,060,395	630,000
Diamond Shamrock Corporation	127,400	2,921,473	2,532,075
Digital Equipment Corporation	44,000	4,527,402	3,168,000
Dresser Industries, Inc.	123,800	2,612,553	2,568,850
Duro-Test Corporation	20,000	388,044	395,200
Eastman Kodak Company	52,500	2,993,792	3,996,563

Schedule of Investments

December 31, 1983
(continued)

EQUITY	Number of Shares	Cost	Market
United States (continued):			
Exxon Corporation	44,600	$ 650,357	$ 1,666,925
FMC Corporation	74,600	2,240,800	3,440,925
Financial Corporation of America	48,000	1,199,299	972,000
First Savings Association of Wisconsin	20,000	245,052	270,000
General Electric Company	69,400	1,846,570	4,068,575
General Motors Corporation	950,000	40,665,143	70,656,250
Genstar Corporation	143,600	2,255,496	3,518,200
GTE Corporation	73,000	1,968,825	3,193,750
Gulfstream Land and Development Corporation	70,000	1,310,218	1,645,000
Hospital Corporation of America	22,200	854,003	876,900
I.M.S. International, Inc.	20,000	398,750	560,000
Intergraph Corporation	24,400	805,200	939,400
International Business Machines Corporation	152,000	4,708,765	18,544,000
La Quinta Motor Inns, Inc.	15,000	233,700	270,000
LTV Corporation	114,000	2,410,976	2,094,750
Manufacturers Hanover Corporation	33,000	1,075,871	1,254,000
Martin Marietta Corporation	36,150	1,347,112	1,292,363
McDermott International, Inc.	38,000	710,835	945,250
McGraw-Edison Company	30,700	1,373,395	1,270,213
Middle South Utilities, Inc.	114,000	1,455,330	1,524,750
Mohasco Corporation	40,000	660,338	870,000
Morgan (J.P.) & Company Inc.	70,000	1,310,880	4,716,250
NL Industries, Inc.	82,000	1,980,712	1,291,500
Northwest Airlines, Inc.	31,200	995,739	1,396,200
Nuclear Pharmacy, Inc.	40,000	515,438	290,000
Pacific Gas & Electric Company	190,000	2,065,483	2,826,250
Penney (J.C.) Company	56,400	2,259,071	3,193,650
Phillips Petroleum Company	81,000	2,576,934	2,794,500
Polaroid Corporation	65,200	1,940,214	2,184,200
Punta Gorda Isles, Inc.	30,000	403,755	243,750
Quaker State Oil Refining Corporation	58,700	1,141,541	1,027,250
RCA Corporation	36,700	1,011,250	1,275,325
Research-Cottrell, Inc.	96,300	1,792,333	1,456,538
Reynolds Metals Company	20,100	717,795	793,950
Ryans Family Steakhouse, Inc.	48,800	1,210,075	1,134,600
Santa Fe Southern Pacific Corporation	109,954.2	2,716,425	2,886,293
Schlumberger, Ltd.	61,675	785,065	3,083,750
Scitex Corporation, Ltd.	37,500	670,463	796,875
Sears, Roebuck & Company	77,610	1,338,040	2,881,271
S I Handling Systems, Inc.	28,000	462,825	490,000
Sperry Corporation	61,400	2,290,962	2,893,475

Schedule of Investments

December 31, 1983
(continued)

EQUITY	Number of Shares	Cost	Market
United States (continued):			
Square D Company	67,000	$ 1,403,466	$ 2,680,000
Sterling Drug Inc.	51,000	1,049,811	1,383,375
Syntex Corporation	23,000	589,255	1,224,750
Texaco Inc.	57,000	1,974,117	2,044,875
Textron, Inc.	83,900	2,210,296	2,737,238
Transamerica Corporation	112,600	2,429,406	3,504,675
Travelers Corporation	107,000	2,144,113	3,397,250
Trilogy, Ltd.	30,000	360,000	281,250
UAL, Inc.	25,000	761,410	918,750
Wells Fargo & Company	31,800	1,018,453	1,260,075
White Consolidated Industries, Inc.	84,300	2,874,464	4,025,325
Xerox Corporation	65,000	3,358,349	3,217,500
Australia and Singapore:			
Australia and New Zealand Banking Group, Ltd.	25,000	85,413	131,777
Bougainville Copper, Ltd.	60,000	100,943	137,624
Development Bank of Singapore, Ltd.	30,000	119,100	144,170
Santos, Ltd.	30,000	161,717	214,800
Singapore News and Publications	50,000	82,141	162,544
Federal Republic of Germany:			
Deutsche Bank A.G. (warrants)	4,500	135,610	206,650
Mercedes-Automobil-Holding A.G.	1,278	145,646	265,976
Siemens A.G.	3,050	399,005	428,927
Japan:			
Alps Electric Company, Ltd.	16,000	177,827	179,620
Canon Inc.	2,000	7,870	13,558
Canon Sales Company, Ltd.	17,250	226,658	294,204
Chugai Pharmaceutical Company, Ltd.	54,337	237,281	228,282
Dai Nippon Printing Company, Ltd.	51,000	144,614	200,389
Fujisawa Pharmaceutical Company, Ltd.	1,000	4,422	3,735
Fujitsu, Ltd.	28,000	92,513	160,039
Hitachi, Ltd.	105,000	352,222	375,083
Hoya Corporation	20,000	125,170	137,306
Kawasaki Steel Corporation	200,000	145,762	158,895
Komatsu, Ltd.	90,000	201,182	212,332
Kyocera Corporation	8,000	288,828	326,426
Matsushita Electric Industrial Company, Ltd.	60,000	386,434	512,955
Mitsubishi Electric Corporation	200,000	395,560	368,740
NEC Corporation	100	339	630
NGK Insulator, Ltd.	60,000	156,095	180,829
Nippon Denso	44,000	273,263	323,852

Schedule of Investments

December 31, 1983
(continued)

EQUITY	Number of Shares	Cost	Market
Japan (continued):			
Nippon Seiko, K.K.	169,600	$ 392,635	$ 453,293
Nippon Shinpan Company, Ltd.	120,000	373,491	355,959
Nippon Steel Corporation	300,000	208,907	228,304
Nitsuko, Ltd.	10,000	28,675	162,069
Nomura Securities Company, Ltd.	124,000	337,541	391,833
Okuma Machinery Works, Ltd.	60,000	185,853	220,985
Okura Electric Company, Ltd.	40,000	134,031	136,960
Olympus Optical Company, Ltd.	46,000	197,854	218,480
Omron Tateisi Electronics Company	41,000	199,013	374,507
Orient Finance Company, Ltd.	5,000	20,369	18,452
Pioneer Electronic Company	31,000	283,767	502,873
Rohm & Company, Ltd.	4,000	165,020	158,895
Sankyo Company, Ltd.	3,000	8,241	9,078
Sanyo Shokai, Ltd.	61,600	97,043	115,095
Sharp Corporation	60,000	288,055	363,343
Taiyo Yuden Company, Ltd.	40,000	225,345	224,526
Takeda Chemical Industries, Ltd.	3,000	10,962	9,388
Tokyo Optical Company, Ltd.	25,000	159,432	167,315
Yamato Transport Company, Ltd.	41,000	130,479	248,498
Netherlands, Sweden and Switzerland:			
Akzo N.V.	4,000	112,995	129,412
Ergamont N.V.	5,000	90,000	64,375
Pharmacia A.B.	6,666	107,564	129,154
Royal Dutch Petroleum Company	3,000	112,290	135,000
Sandoz A.G.	600	265,909	317,963
Schweizerische Bankgesellshaft (warrants)	500	173,991	286,763
Swissair-Schweiz Luffwerkehr A.G.	500	210,736	229,410
United Kingdom and Canada:			
British Columbia Forest Products, Ltd.	8,100	79,286	87,053
British Petroleum Company, P.L.C.	25,000	128,715	147,327
BSR International, P.L.C.	60,000	57,314	174,180
Fisions, P.L.C.	16,000	195,896	170,000
Glaxo Holdings, P.L.C.	18,000	249,330	183,411
Grand Metropolitan, P.L.C.	32,142	116,407	153,959
Imperial Chemical Industries, P.L.C.	10,000	59,918	92,315
London & Scottish Marine Oil Company, P.L.C.	35,000	170,871	150,375
Mercantile House Holding, P.L.C.	20,000	118,717	119,604
Royal Bank of Scotland	60,000	134,985	191,598
Sun Alliance & London Insurance, Ltd.	9,000	179,096	185,338
Total equity		182,411,395	256,338,537
Total fixed income		102,902,547	104,425,759
Total investments		$285,313,942	$360,764,296

1983
Schedule of Grants and Appropriations

	Unpaid Dec. 31, 1982	1983 Authorized	1983 Payments	Unpaid Dec. 31, 1983
Alabama, University of	—	$ 25,000	$ 12,500	$ 12,500
Alberta, University of	—	20,000	20,000	—
American Academy of Arts and Sciences	—	300,000	150,000	150,000
American Association for the Advancement of Science	—	20,000	20,000	—
American Council of Learned Societies	—	20,000	20,000	—
American Economic Association	—	305,200	105,200	200,000
American Statistical Association	—	7,500	7,500	—
Arizona, University of	—	25,000	12,500	12,500
Association for Media-Based Continuing Education for Engineers	$ 92,000	—	92,000	—
Association for the Integration of Management, Inc.	—	20,000	20,000	—
Association of American Publishers, Inc.	—	20,000	20,000	—
Association of Governing Boards of Universities and Colleges	—	20,000	20,000	—
Bank Street College	—	20,000	20,000	—
Boston College	—	25,000	12,500	12,500
Boston Film Video Foundation, Inc.	—	20,000	20,000	—
Boston University	50,000	35,000	72,500	12,500
Brandeis University	—	100,000	75,000	25,000
Brookings Institution	200,000	745,000	678,000	267,000
Brown University	87,500	82,000	144,500	25,000
Bryn Mawr College	12,500	—	12,500	—
Business and Management Foundation of Maryland, Inc.	—	10,000	10,000	—
California, University of	657,500	2,382,412	863,912	2,176,000
California Institute of Technology	37,500	71,286	83,786	25,000
Carleton College	250,000	80,000	140,000	190,000
Carnegie Institution of Washington	12,500	—	12,500	—
Carnegie-Mellon University	548,000	1,386,000	1,484,000	450,000
Case Western Reserve University	12,500	—	12,500	—
Catticus Corporation	—	19,240	19,240	—
Center for Advanced Study in the Behavioral Sciences	250,000	—	60,000	190,000
Chicago, University of	335,000	150,000	422,500	62,500
Clarkson College	—	216,000	135,000	81,000
Cognitive Neuroscience Institute	350,000	—	150,000	200,000
Colby College	—	40,000	40,000	—
Cold Spring Harbor Laboratory	—	20,000	20,000	—
Colorado, University of	25,000	—	25,000	—
Colorado State University	12,500	—	12,500	—

1983
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1982	1983 Authorized	1983 Payments	Unpaid Dec. 31, 1983
Columbia University	$ 100,000	$ 75,000	$ 137,500	$ 37,500
Committee for Economic Development	—	75,000	—	75,000
Community Service Society of New York	50,000	—	50,000	—
Connecticut Educational Telecommunications Corporation	—	20,000	20,000	—
Consortium for Mathematics and its Applications	—	122,000	61,000	61,000
Cornell University	125,000	325,000	237,500	212,500
Council on Foundations, Inc.	—	40,000	40,000	—
Council on Library Resources	320,000	20,000	100,000	240,000
Dartmouth College	50,000	250,000	175,000	125,000
Davidson College	250,000	—	125,000	125,000
Delaware, University of	—	200,000	97,500	102,500
Denver, University of	—	40,000	40,000	—
Duke University	100,000	25,000	125,000	—
Educational Broadcasting Corporation	—	20,000	20,000	—
Emory University	12,500	—	12,500	—
Five Colleges, Inc.	16,000	—	16,000	—
Florida State University	—	65,000	52,500	12,500
Georgia, University of	—	25,000	12,500	12,500
Georgia Institute of Technology	—	128,000	115,500	12,500
Georgia State University	—	20,000	20,000	—
Grinnell College	250,000	—	100,000	150,000
Harvard University	962,250	745,400	1,200,150	507,500
Hoover Institution on War, Revolution and Peace	—	20,000	20,000	—
Houston, University of	12,500	—	12,500	—
Illinois, University of	12,500	202,500	115,000	100,000
Indiana University Foundation	25,000	25,000	37,500	12,500
Industrial Relations Counselors, Inc.	—	200,000	100,000	100,000
Johns Hopkins University	25,000	62,000	25,000	62,000
Kansas State University	12,500	—	12,500	—
Kentucky, University of, Research Foundation	25,000	25,000	37,500	12,500
Lafayette College	250,000	—	100,000	150,000
Louisiana State University	—	25,000	12,500	12,500
Marine Biological Laboratory	—	4,000	4,000	—
Maryland, University of	97,500	16,000	113,500	—
Maryland, University of, Foundation, Inc.	197,500	—	—	197,500
Massachusetts, University of	40,000	61,000	52,500	48,500
Massachusetts Institute of Technology	1,684,500	978,700	1,608,200	1,055,000

1983
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1982	1983 Authorized	1983 Payments	Unpaid Dec. 31, 1983
Mathematical Association of America	—	$ 20,000	$ 20,000	—
Medical College of Pennsylvania	$ 12,500	—	12,500	—
Meharry Medical College	330,000	—	260,000	$ 70,000
Menlo College	—	27,000	27,000	—
Michigan, University of	320,000	101,500	321,500	100,000
Michigan State University	—	25,000	12,500	12,500
Minnesota, University of	12,500	399,016	264,016	147,500
Montclair State College	—	40,000	40,000	—
Mount Holyoke College	250,000	—	100,000	150,000
National Affairs, Inc.	—	20,000	20,000	—
National Bureau of Economic Research, Inc.	300,000	—	150,000	150,000
New Hampshire, University of	—	20,000	20,000	—
New Mexico, University of	—	25,000	12,500	12,500
New School for Social Research	51,000	—	33,000	18,000
New York Institute of Technology	—	20,000	20,000	—
New York Regional Association of Grantmakers, Inc.	—	11,667	11,667	—
New York University	60,000	525,548	256,548	329,000
North Carolina, University of	—	25,000	12,500	12,500
Northwestern University	—	215,000	117,500	97,500
Oberlin College	250,000	—	100,000	150,000
Ohio State University Research Foundation	25,000	100,000	75,000	50,000
Ontario Institute for Studies in Education	50,000	—	50,000	—
Oregon, University of, Foundation	25,000	30,000	55,000	—
Pennsylvania, University of	250,000	154,643	242,143	162,500
Pennsylvania State University	25,000	—	25,000	—
Pittsburgh, University of	25,000	18,000	43,000	—
Princeton University	237,500	352,500	327,500	262,500
Purdue University	25,000	—	25,000	—
Rand Corporation	—	411,000	241,000	170,000
Research Foundation of State University of New York	25,000	606,000	318,500	312,500
Research Foundation of The City University of New York	100,000	10,000	110,000	—
Resources for the Future, Inc.	80,000	—	80,000	—
Rice University	12,500	—	12,500	—
Rochester, University of	533,000	25,000	270,000	288,000
Rockefeller University	12,500	2,500	15,000	—
Russell Sage Foundation	155,000	—	155,000	—
Rutgers University Foundation	25,000	8,000	33,000	—
Saint Olaf College	—	40,000	40,000	—
Salk Institute for Biological Studies	12,500	25,000	25,000	12,500

1983
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1982	1983 Authorized	1983 Payments	Unpaid Dec. 31, 1983
SIAM Institute for Mathematics and Society	$ 55,000	—	$ 40,000	$ 15,000
Sigma Xi	—	$ 70,000	10,000	60,000
Simon Fraser University	12,500	—	12,500	—
Smith College	140,000	—	70,000	70,000
Social Science Research Council	—	6,000	6,000	—
South Carolina, University of	—	50,000	25,000	25,000
Southern California, University of	12,500	—	12,500	—
Stanford University	210,000	796,824	411,824	595,000
Swarthmore College	85,000	—	45,000	40,000
Syracuse University	70,000	—	50,000	20,000
Tennessee, University of	12,500	—	12,500	—
Texas, University of	462,500	131,000	281,000	312,500
Tufts University	—	50,000	50,000	—
Union College	250,000	—	65,000	185,000
United Nations Association of the United States of America	—	20,000	20,000	—
United Way of Tri-State	—	3,500	3,500	—
Utah, University of	25,000	—	25,000	—
Vanderbilt University	—	400,000	400,000	—
Vassar College	250,000	—	150,000	100,000
Virginia, University of	12,500	38,863	38,863	12,500
Virginia Polytechnic Institute and State University	—	1,103	1,103	—
Washington, University of	12,500	281,000	196,000	97,500
Washington University	85,000	50,000	110,000	25,000
Wellesley College	250,000	—	80,000	170,000
Wesleyan University	—	25,000	12,500	12,500
William and Mary, College of	—	25,000	12,500	12,500
Williams College	250,000	—	100,000	150,000
Wisconsin, University of	122,000	12,500	122,000	12,500
Wyoming, University of	—	25,000	12,500	12,500
Yale University	175,000	57,000	169,500	62,500
Yeshiva University	12,500	—	12,500	—
Sloan Fellowships for Basic Research to be granted in ensuing year	2,200,000	50,000	—	2,250,000
Officer grant appropriations for grants in ensuing years	1,000,000	—	—	1,000,000
Book program	354,997	—	109,439	245,558
Planning grants — New Liberal Arts Program	—	95,000	—	95,000
Other appropriations for grants and related expenses	65,002	120,507	98,496	87,013
	16,878,749	15,564,909	16,753,087	15,690,571
Reduction for grant transfers		126,194	126,194	
	$16,878,749	$15,438,715	$16,626,893	$15,690,571

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Alfred P. Sloan Foundation

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

Report for 1984

Alfred P. Sloan, Jr.
1875—1966

The Life of Alfred P. Sloan, Jr., in Brief

Alfred Pritchard Sloan, Jr., was born in New Haven, Connecticut, May 23, 1875, the first of five children of Alfred Pritchard Sloan, Sr., and Katherine Mead Sloan. His father, a machinist by training, was then a partner in a small company importing coffee and tea. The family moved to Brooklyn in 1880, where it was particularly active in the Methodist Church (young Alfred's maternal grandfather was a Methodist minister). Alfred, Jr., excelled as a student both in the public schools and at the Brooklyn Polytechnic Institute where he completed college-preparatory schooling. After some delay in being admitted to the Massachusetts Institute of Technology (which considered him too young when he first applied), he entered M.I.T. in 1892 and took a degree in electrical engineering in three years as the youngest member of his graduating class.

Mr. Sloan began his working career as a draftsman in a small machine shop, the Hyatt Roller Bearing Company of Newark, New Jersey. At his urging, Hyatt was soon producing a new, durable steel bearing for automobiles. In 1898 he married Irene Jackson of Roxbury, Massachusetts and the next year became President, at age 24, of Hyatt, where he supervised all areas of the company's business: manufacturing, financing, engineering, and marketing. Hyatt bearings became a standard in the automobile industry, and the company grew rapidly under his leadership. In 1916 the Hyatt Roller Bearing Company, together with a number of other manufacturers of automobile accessories, merged with the United Motors Corporation, of which Mr. Sloan became President. Two years later that company became part of the General Motors Corporation (itself established in 1908 as the General Motors Company), and Mr. Sloan was named Vice President in Charge of Accessories and a member of the Executive Committee.

He was elected President of General Motors in 1923, succeeding Pierre S. du Pont, who said of him on that occasion: "The greater part of the successful development of the Corporation's operations and the building of a strong manufacturing and sales organization is due to Mr. Sloan. His election to the presidency is a natural and well-

merited recognition of his untiring and able efforts and successful achievement." Mr. Sloan had developed by that time his system of disciplined, professional management that provided for decentralized operations with coordinated centralized policy control, which he applied to General Motors and set the Corporation on its course of industrial leadership. The next 23 years—Mr. Sloan's tenure as Chief Executive Officer of General Motors—were years of enormous expansion for the Corporation and of a steady increase in its share of the automobile market.

In 1937 Mr. Sloan was elected Chairman of the Board of General Motors and continued as Chief Executive Officer until 1946. When he resigned from the chairmanship in 1956, the General Motors Board said of him: "The Board of Directors has acceded to Mr. Sloan's wish to retire as Chairman. He has served the Corporation long and magnificently. His analysis and grasp of the problems of corporate management, his great vision and rare good judgment, laid the solid foundation which has made possible the growth and progress of General Motors over the years." Mr. Sloan was then named Honorary Chairman of the Board and retained that title until his death February 17, 1966. For many years before his death he devoted the largest share of his time and energy to philanthropic activities, both as a private donor to many causes and organizations and through the Alfred P. Sloan Foundation, which he established in 1934.

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Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and incorporated in the state of Delaware. Over the last five years the Foundation's grant expenditures have averaged a little over $16 million a year, and assets at market value at the end of 1984 were $371 million. The Foundation publishes an annual report, free on request, that gives detailed information about all the programs and activities of the Foundation. It also publishes at irregular intervals other papers and reports related to its programs.

The main interests of the Foundation are in higher education, with an emphasis on science, technology, economics, management, and education for the public service; and on instructional programs and problems of society associated with these fields. The Foundation's activities do not extend to primary or secondary education, religion, the creative or performing arts, or to medical research or health care, or to the humanities. Grants are not made for endowments or for buildings or equipment, and are very rarely made for general support or for activities outside the United States.

General and Particular Programs

In 1969 the Foundation adopted a mode of operation that distinguished between the "general program," under which the established interests of the Foundation were pursued, and a set of "particular programs," which focused on sharply defined topics for more limited periods of time. Four particular programs were developed and carried to completion between 1969 and 1979: one to increase the number of minority students in medicine and management; one to support experimental work in educational technology; one to help establish the new discipline of neuroscience; and one to increase the number of minority students in engineering. Expenditures in these programs ranged from nine to fourteen million dollars over a period of five to seven years.

Three particular programs are now in operation: the Cognitive Science Program is in its third and final phase; the New Liberal Arts Program moved into its second year of full operation in 1984; and the Minorities in Public Management Program was at full maturity in 1984. These three particular programs are reviewed at appropriate places in this report.

How to Apply for a Grant

The Foundation's funds are spent in two ways: on programs and activities developed by the Foundation's staff and for which grants are made, usually on a competitive basis, in support of individuals and institutions; and in response

to proposals that come unsolicited to the Foundation and that are also judged competitively. In considering both types of proposals, the Foundation often seeks the advice of outside reviewers. The Foundation unfortunately is obliged to turn down many more proposals, often proposals of great merit, than its resources allow it to support.

Application can be made at any time for support of activities falling within the guidelines indicated above. Grants of $20,000 or less are made throughout the year by the officers of the Foundation and may be made up to $30,000 for projects with high travel costs; grants over that amount are made by the Trustees, who meet five times a year for that purpose. Letters of application are normally sent to the president of the Foundation and include, in addition to information about the applicant and the work the applicant proposes to do, information as to the cost and duration of the work, and in the case of new applicants the tax status of the organization that would administer the grant unless it is a recognized institution of higher education.

The Foundation has no deadlines or standard application forms. Often a brief letter of inquiry, rather than a fully developed proposal, is an advisable first step for an applicant, conserving his time and allowing the Foundation to give the applicant a preliminary response as to the possibility of support.

President's Statement

The year 1984 marked the 40th anniversary of the publication of Gunnar Myrdal's *An American Dilemma* and the 20th anniversary of the Civil Rights Act. In the years since 1944, substantial progress toward racial equality has been made in some areas of American life, but progress has been disappointingly slow in others. For example, little if any progress has been made toward the elimination of de facto residential segregation, and the median income of non-white families is still well under two-thirds that of white families.

Fortunately, higher education has in general been one of the areas of progress. By 1980-1981, minorities were 16 percent of full time enrollment in higher education, and received 12 percent of the bachelor's degrees awarded. For first professional degrees, however, the percentage received by minorities was only nine percent.

Private foundations have played an important part in improving the access of minorities to higher education. Although the Sloan Foundation has been neither one of the first of these foundations nor one of the largest spenders, it has had a substantial impact within the special area it has chosen — increasing opportunities for minority students to receive professional education.

Since 1970, the Sloan Foundation has supported programs designed to help minority students enter the professions of medicine, management, engineering, and public policy. For the past five years, the Foundation has funded a program to promote professional careers in the public sector for minority students. During 1984, the Trustees designated this program as the Particular Program for Minority Students in Public Policy, in recognition of the substantial scale to which this activity has grown. It thus becomes the third in the series of Particular Programs for minorities which began with the Particular Program in Medicine and Management from 1970 to 1974. The second was the Particular Program for Minorities in Engineering, which operated from 1973 to 1979.

The current Particular Program is conducted in cooperation with the Association for Public Policy Analysis and Management (APPAM) and has three distinct parts, which are discussed in more detail on pages 45-49 of this report. These consist of (1) seven summer institutes for minority students who have completed the junior year in college (an eighth will be added in 1985); (2) two advanced summer institutes for students who have participated in the post-junior year institutes, have been admitted to one of 20 participating graduate programs in public policy and have completed their senior year; and (3) Foundation-funded fellowships for these students in their first year of a two-year program leading to the Master of Public Affairs or an equivalent degree. The Foundation's expeditures on these activities in 1984 were just under $2 million. Minority students who have participated in the summer programs are generally doing good work in the most rigorous graduate programs in public affairs.

Minorities are now well represented in government positions at the lower administrative levels. They are also well represented among elected officials, especially in large cities. There are however, far fewer blacks and Hispanics at the highest level staff positions in the public sector, such as budget directors, directors of planning, or controllers. We hope that eventually the Foundation's program will help to provide many well-qualified minority candidates for such positions.

During 1984, the Foundation conducted an evaluation of the Particular Program for Minorities in Engineering Education, which ended five years earlier. A total of $13.3 million was spent in this program between 1973 and 1979. Its goal was to correct the severe underrepresentation of minorities in engineering graduates. In 1972-1973 minorities made up only 3.5 percent of engineering students and 2.9 percent of engineering graduates. A decade later, these figures had increased to 8.2 percent and 4.8 percent respectively. These are substantial gains, especially in view of the rapid rise over this period in total engineering enrollment. Minority enrollment, however, has not yet reached parity with the proportion of minorities in the population.

The largest component of the Particular Program for Minorities in Engineering was the formation and funding of several regional consortia involving collaboration between engineering schools, public secondary schools, and industry. These provided special classes and activities for minority high school students to prepare and motivate them for admission to engineering schools. Five years after the end of the Foundation program many of these consortia are alive and well. The most vigorous is Mathematics, Engineering, and Science Achievement (MESA) in California, now funded by the State government and by industry. MESA has been cloned successfully and similar programs now operate in several Western states. Most of the other regional consortia have not received substantial government support. Although they have not been able to expand their activities since their foundation support ended, they are still functioning effectively.

The Foundation has also supported since 1974 a summer program sponsored by the American Economic Association designed to prepare minority students for Ph.D. programs in economics. An evaluation of this program conducted by an outside consultant several years ago concluded that the program was valuable to the participants and well worth continuing. This program addresses a portion of one of the most difficult problems of all—how to increase the very small minority representation in the faculties of selective colleges and major research universities. Black and Hispanic undergraduates well qualified to enter Ph.D. programs in the arts and sciences are also well qualified for law school, medical school, or business school. These schools prepare students for careers offering higher incomes than college or university teaching and often providing more direct opportunities to serve minority communities. The persistence of such problems as the underrepresentation of minorities in university

faculties and the lack of readily apparent solutions to them reminds us that we are not yet finished with the agenda set by Gunnar Myrdal 40 years ago. The Foundation therefore expects to continue its efforts in this arena for some years to come.

During 1984, Herbert E. Longenecker retired from the Board of Trustees. He had served on the Board since 1971 and on the Executive Committee since 1974. We shall miss his lively participation in the affairs of the Foundation.

Albert Rees

President

Grants and Activities in 1984

The New Liberal Arts Program

This program, the sixth of the Foundation's "particular programs," moved into its second year of full operation in 1984. Its aim is the enrichment of the undergraduate curriculum in quantitative reasoning, in the application of mathematical analysis across many courses and disciplines, and in the teaching of technology and the principles of engineering to liberal arts students.

The New Liberal Arts Program began with small planning grants to 30 independent liberal arts colleges in the spring of 1982. These grants were followed later that year by major awards of $250,000 each to 10 of the colleges and presidential discretionary grants of $25,000 to the other 20 that had taken part in this first round of competition. Since that time, major grants have gone to a small number of universities, to some of the same 20 colleges that got discretionary grants, and to several predominantly black institutions. The Foundation's annual reports for 1982 and 1983 describe in detail the activities for those years in the New Liberal Arts Program and are free on request. A pamphlet entitled, "The New Liberal Arts Program; a Status Report," summarizes much of our experience to date in this program and is also free on request.

Again in 1984 we found it necessary to restrict the program to the liberal arts colleges already participating. We are encouraged by the number of other institutions seriously interested in the program and anxious to enter it; but any major expansion of the program lies beyond our financial reach for the present. Nor is the question merely one of resources: we believe it important for us to have a body of experience and tested teaching materials to offer new institutions before inviting them into the program.

After two years of full operation of the New Liberal Arts Program, we are confident of its timeliness and we take pleasure in the enthusiasm of the institutions at work in it. An outside advisory committee of the following persons assists the Foundation is all phases of the program:

Elting E. Morison, Professor Emeritus, Massachusetts Institute of Technology, chairman of the committee

John G. Kemeny, Professor of Mathematics, Dartmouth College

Nannerl O. Keohane, President, Wellesley College

William Kessen, Professor of Psychology, Yale University

John G. Truxal, Distinguished Teaching Professor of Engineering and Applied Science, State University of New York, Stony Brook

A Second Set of Trustee Grants to Colleges
$1,050,000

The 20 colleges that received discretionary grants in the first round of competition used them in 1983 to pursue activities in the new liberal arts to which their presidents gave the highest priority. Members of the Foundation's staff and of our outside advisory committee for the New Liberal Arts Program visited all 20 of these institutions in the spring of 1984. On the basis of these visits and other considerations, seven of the colleges were invited to submit proposals for grants of $150,000 before the end of 1984. Our purpose in making these second grants was to be of as much continuing help as possible to the colleges that joined us in the beginning of the New Liberal Arts Program; for we and they recognize that a program of this complexity will require long-term commitments from both parties. We hope to make grants of a similar size in the future to still more colleges from the 20 that got the original discretionary grants.

The seven colleges receiving grants in 1984 will undertake activities that are central to the New Liberal Arts Program. There will be an emphasis on faculty development at all the colleges, especially for faculty members in the humanities and social sciences; frequent use will be made of the institution's own faculty but whenever possible the colleges will also send faculty members to special summer workshops supported by Sloan. There will be a variety of experiments in interdisciplinary course development, especially in the teaching of technology to liberal arts students — a problem that continues to be the single most difficult one in the program. And there will be a set of complementary activities, including outside speakers and visiting lecturers, on each campus. The seven colleges that received these grants of $150,000 in 1984 (all are over a three-year period except Colby and Bryn Mawr, which are two years) were the following:

Bryn Mawr College
Bryn Mawr, Pennsylvania 19010
(Project director: Neal B. Abraham, Chairman, Department of Physics.)

Bucknell University
Lewisburg, Pennsylvania 17837
(Project director: Frances Fergusson, Vice President for Academic Affairs.)

Colby College
Waterville, Maine 04901
(Project director: Douglas Archibald, Vice President for Academic Affairs and Dean of the Faculty.)

Colgate University
Hamilton, New York 13346
(Project director: Charles E. McClennen, Associate Dean of the Faculty.)

Franklin and Marshall College
Lancaster, Pennsylvania 17604
(Project directors: Bradley Dewey, Dean of the College and Academic Vice President; and Robert Friedrich, Director of Academic Computing.)

Middlebury College
Middlebury, Vermont 05753
(Project director: Nicholas Clifford, Provost.)

Trinity College
Hartford, Connecticut 06106
(Project director: J. Ronald Spencer, Associate Academic Dean.)

Trustee Grants for Minority Institutions
$930,000

For many years the Foundation has made special provision in its programs for minority students and institutions. In 1983 we laid the groundwork for the minorities component of the New Liberal Arts Program with a grant of $103,000 to the Georgia Institute of Technology. That grant supported the formation of a consortium of historically black colleges and universities now working in collaboration with Georgia Tech and with one another to develop instructional materials in technology and quantitative reasoning. The consortium is known as "Resourceful Exchange: Technology and the Liberal Arts" (RETLA). By the end of 1984, RETLA had grown to 21 historically black institutions.

The Foundation conducted a competition last year among the members of RETLA similar to the competiton that made up the first phase of the New Liberal Arts Program. All members were invited to accept a planning grant of $5,000 with which to prepare a proposal to the Foundation for a major grant; 18 institutions applied for the planning grant and 16 produced proposals. These proposals were evaluated with the help of our outside advisory committee, site visits were made to a number of campuses, and four grants of $150,000 each were awarded to the following institutions:

North Carolina Agricultural and Technical State University
Greensboro, North Carolina 27411
(Project directors: Sarah Kirk, Professor of Sociology; and Peter Myers, Professor of History.)

Rust College
Holly Springs, Mississippi 38635
(Project director: Leroy Frazier, Professor of Chemistry.)

Spelman College
Atlanta, Georgia 30314
(Project director: Sylvia T. Bozeman, Head, Department of Mathematics.)

Tuskegee Institute
Tuskegee, Alabama 36088
(Project director: Francis A. Taylor, Professor of Psychology.)

At the conclusion of this competition, presidential discretionary grants were made, as in the first phase of the New Liberal Arts Program, to the colleges that had taken part but did not win major awards. We are aware that such grants are often seen as consolation awards, but our intention was quite otherwise; it was to allow these institutions to remain active in RETLA and to move forward, on however small a scale, with work in the new liberal arts on their campuses. We hope to provide continuing help to some of these institutions in future years, as we have to some of the colleges that got discretionary grants in the first round. The following institutions received discretionary grants of $15,000 last year (the project director in each case is the president or chancellor):

Albany State College
Albany, Georgia 31705
(Billy C. Black, President.)

Bennett College
Greensboro, North Carolina 27420
(Isaac H. Miller, President.)

Dillard University
New Orleans, Louisiana 70122
(Samuel DuBois Cook, President.)

Fort Valley State College
Fort Valley, Georgia 31030
(Luther Burse, President.)

Morehouse College
Atlanta, Georgia 30314
(Hugh M. Gloster, President.)

Morris Brown College
Atlanta, Georgia 30314
(Robert Threatt, President.)

North Carolina Central University
Durham, North Carolina 27707
(Leroy T. Walker, Chancellor.)

Oakwood College
Huntsville, Alabama 35896
(Calvin B. Rock, President.)

Paine College
Augusta, Georgia 30910
(William A. Harris, President.)

Savannah State College
Savannah, Georgia 31404
(Wendell G. Rayburn, President.)

South Carolina State College
Orangeburg, South Carolina 29117
(M. Maceo Nance, Jr., President.)

Xavier University
New Orleans, Louisiana 70125
(Norman C. Francis, President.)

All of these institutions, together with a few others, are continuing their participation in RETLA. To complement this series of grants and insure the financial health of that consortium, the Foundation made the following grant in 1984:

Georgia Institute of Technology **$150,000**
Atlanta, Georgia 30332 (over one year)

Over the last two years, Georgia Tech has been the organizational center for a series of workshops attended by the members of RETLA. These workshops have been a collaborative activity between faculty members from Georgia Tech in engineering, computing, and mathematics, and faculty members representing many fields from the RETLA schools. Together they develop teaching modules in technology and quantitative reasoning to be tested at the member schools and then revised on the basis of experience. This grant covers the costs for one year of the workshops and related activities of the RETLA consortium. (Project directors: Melvin Kranzberg, Calloway Professor of the History of Technology; Paul G. Mayer, Regents' Professor of Civil Engineering; A. D. Van Nostrand, Head, Department of English; and Donovan B. Young, Associate Professor of Engineering — all of Georgia Tech. All activities of the RETLA consortium are under the supervision of the RETLA advisory board, whose members are drawn from the RETLA schools.)

Other Trustee Grants

Duke University **$348,000**
Durham, North Carolina 27706 (over three years)

Our intention in the New Liberal Arts Program has been to concentrate on independent liberal arts colleges in the early years. We believe the program should expand in time to public and private universities. A few universities have had a special role in the program from the start, mostly for the development by engineering educators of materials for the teaching of technology to liberal arts students; but Duke is the first university to receive a grant for a comprehensive program of work in the new liberal arts aimed at its own students and at basic institutional change. The Duke program was the product of a long planning process and represents the first phase of work that is expected to extend over many years. During the first phase, the university will (a) develop a large number of new courses for non-majors in applied mathematics, computer science, and technology; (b) develop several courses for faculty members in the humanities and social sciences on technological and mathematical concepts and processes; and (c) institute a series of seminars for doctoral students in mathematics, computer science, and engineering to prepare them to teach these subjects to undergraduates majoring in other fields. Duke is sensitive to the wide array of problems, professional and pedagogical, that must be surmounted to make its ambitious program a success; and it has undertaken the program in the strong belief, which the Foundation shares, that it can indeed succeed and will in time offer one model of university participation in the New Liberal Arts Program. (Project director: Joel L. Fleishman, Vice Chancellor.)

Brandeis University **$250,000**
Waltham, Massachusetts 02254 (over two years)

This institution occupies a special niche between being a leading liberal arts college and a strong but small university. With this grant the university will undertake a program centered in the social sciences, which are disciplines of particular strength at Brandeis and in which the institution also gives doctoral degrees. It will develop 10 or more new courses in these fields, emphasizing mathematical and statistical methods and problem solving techniques, and making heavy use of quantitative case studies. An interdisciplinary foundation course in quantitative skills applicable broadly to the social sciences will be a prerequisite. A senior-level course in technology, drawing on faculty members from many departments, will also be developed. (Project director: Attila O. Klein, Dean of the College.)

Princeton University **$250,000**
Princeton, New Jersey 08544 (over two years)

One of the best known and most effective engineers with a special interest in the teaching of technology to liberal arts students is David P. Billington, Professor of Civil Engineering at Princeton. The course materials he has developed over many years in the technology of large structures such as bridges and skyscrapers have proved of great interest to undergraduate students. They have also proved of great interest to faculty members from colleges active in the New Liberal Arts Program who have attended summer workshops in technology supported by the Foundation. This grant will permit a group of four faculty members at Princeton, with Professor Billington as project director, to prepare an integrated series of studies in engineering for liberal arts students. They plan to develop materials with numerical, historical, and biographical dimensions, and topics on such contemporary issues as the urban infrastructure, reindustrialization, automation, and environmental pollution.

Stanford University **$213,000**
Stanford, California 94305 (over three years)

James L. Adams, Associate Dean of Engineering at Stanford, is another of our leading educators with a deep interest in the teaching of technology to liberal arts students. He is the director of Stanford's Program in Values, Technology, Science, and Society, one of the first programs of this kind to be established. He also played a leading role in the adoption by Stanford a few years ago of a requirement that all undergraduates take a least one course in technology or applied science. With this

grant, four faculty members at Stanford, representing the fields of physics, chemistry, mathematics, and engineering, will develop a one-year sequence of courses for undergraduates not majoring in these fields. They will develop materials from all four disciplines that explore the nature of problems in each, that compare the analytical methods employed in each, and that illuminate the ways in which the four fields interact. (Project director: Professor Adams.)

Carnegie-Mellon University **$175,000**
Pittsburgh, Pennsylvania 15213 (over four years)

Few of the colleges in the New Liberal Arts Program have engineering departments, and the few that do have little experience in teaching technology to non-engineering students. With the help of engineering educators from universities, faculty members from the colleges are trying to bring their own knowledge of engineering and technological methods to the point that they can infuse technology into their regular courses and also teach it as a separate subject. The task is a difficult one that requires a heavy investment of the college teacher's time and energy. Colleges might alleviate the problem if they could attract engineers to their faculty who are interested in teaching technology to liberal arts students. This grant will help the Department of Engineering and Public Policy at Carnegie-Mellon test a slightly different approach. The department will establish a forgivable loan program for some of its doctoral students. Under the plan, these students will receive a loan adequate to meet their tuition and living costs over the last two years of their doctoral work; the loan will then be forgiven at the rate of one loan year for every two years of teaching if the new Ph.D.'s accept positions at liberal arts colleges. The loan will be fully forgiven after four years of such service. This highly experimental plan will be tested over the next four years on a small scale at Carnegie-Mellon. (Project director: M. Granger Morgan, Head, Department of Engineering and Public Policy.)

Research Foundation of the State University of New York **$150,000**
P. O. Box 9 (over three years)
Albany, New York 12201

The Foundation made a grant of $90,000 in 1981 to support a group of engineering educators at the Stony Brook campus of the State University of New York; the grant allowed them to continue to develop materials in the teaching of technology to non-engineering students. The project went well under the direction of John G. Truxal, Distinguished Teaching Professor of Engineering and Applied Science at Stony Brook; Professor Truxal, who also serves on our outside advisory committee for the

New Liberal Arts Program, is perhaps the best known engineering educator in the teaching of technology to non-engineering students. The present grant represents renewal support for Professor Truxal, the project director, and his associates to develop still more materials and to convert some of the existing materials to a form usable by faculty members in liberal arts colleges who are not themselves engineers.

Rensselaer Polytechnic Institute **$34,000**
Troy, New York 12181 (over two years)

The Mathematics Institute at Oxford University has conducted a highly successful workshop once a year for the last few years at which academic and industrial mathematicians together with students have worked on applied mathematical problems. Rensselaer Polytechnic Institute has maintained a close liaison with the Oxford group and with this grant will establish a similar program that will include mathematicians from the colleges active in the New Liberal Arts Program. (Project director: Robert O'Malley, Chairman, Department of Mathematics.)

Great Lakes Colleges Association **$33,000**
220 Collingwood Avenue, Suite 240 (over one year)
Ann Arbor, Michigan 48103

Although the Foundation is not able at present to expand the New Liberal Arts Program with major grants to additional institutions, we can sometimes help other colleges carry out planning projects. This grant, which will be matched by the Great Lakes Colleges Association from internal funds, will support a year-long planning and development project in the new liberal arts by the 12 colleges that make up the organization. (Project director: Jon W. Fuller, President.)

Research Foundation of the State University of New York **$33,000**
P. O. Box 9 (over one year)
Albany, New York 12201

The Foundation made a grant in December 1983 to support a summer workshop in medical technology administered by Professor John G. Truxal of the State University of New York, Stony Brook. The workshop was oversubscribed; this grant was supplementary support to meet the unexpected costs.

Claremont McKenna College **$31,000**
Claremont, California 91711 (over two years)

This too is a planning grant to be matched by the recipients. It will help meet the costs of an extended planning project in the new liberal arts that may involve all the institutions of the Claremont consortium. (Project director: Gaines Post, Jr., Dean of the Faculty of Claremont McKenna.)

Harvard University **$15,000**
Cambridge, Massachusetts 02138 (over one year)

Support for a second summer workshop in quantitative sociology for faculty members from the new liberal arts colleges. (Project director: James Davis, Professor of Sociology.)

Bowdoin College **$10,000**
Brunswick, Maine 04011 (over one year)

Support for a conference on the special problems of academic computing that are being experienced by the colleges in the New Liberal Arts Program. (Project director: Norman Gibbs, Professor of Computer Science.)

In January 1984 the Trustees approved an internal appropriation of $15,000 to meet the costs of a two-day conference of college presidents, convened by the staff of the Foundation. This meeting was held in October of last year and brought together the heads of all 21 institutions that had received major grants in the New Liberal Arts Program.

The Cognitive Science Program

This program, the largest and longest of the seven "particular programs" we have conducted since the concept of particular programs was adopted in 1969, continued last year to move through its third and final phase. This highly interdisciplinary program of basic research embraces the fields of psychology, neuroscience, linguistics, computer science, philosophy, and anthropology, and may encompass still others in the future. Its central concern is with nothing less than man's understanding of his own mental makeup; with the complex and little understood processes by which human beings reason, remember, acquire language, solve problems, make decisions, and take actions on the basis of information the brain receives through the sensory organs.

The program began in 1977 with grants to researchers in academic fields that at the time were loosely related, if they were related at all. The Foundation's early grants helped researchers begin to work together and to develop some understanding of the concepts and methods of one another's disciplines. From these interdisciplinary beginnings many new lines of research emerged. The program entered its second phase in 1979 with major grants to institutions for the development of postdoctoral training programs. The third and final phase of our program began in 1981, overlapping with phase two, and is expected to extend through the 1987-88 academic year. Grants in this last phase of the program continued in 1984 but on a diminishing scale as we look toward the end of the program. They were again concentrated, as in previous years, on institutional development: on the establishment at each university of a self-sustaining center or department where a long-term program of training and research in cognitive science will be carried out after the Foundation's support comes to an end.

To ensure the orderly development of phase three, the Foundation's Trustees took the unusual step in 1981 of identifying those universities to which grants were expected to be made throughout the final phase of the program, and of committing the Foundation to these grants, totaling $10 million, as proposals were perfected and approved individually in the future. When the final grants are made in phase three, the Foundation will have invested over $20 million in this new field of intense interest to both laymen and professionals.

An outside advisory committee of the following persons assists the Foundation in all aspects of the program:

Robert Q. Marston, President, University of Florida, chairman of the committee

Theodore H. Bullock, Professor of Neurosciences, University of California, San Diego

Jerome A. Feldman, Professor of Computer Science, University of Rochester

William Kessen, Professor of Psychology, Yale University

William A. Nierenberg, Director, Scripps Institution of Oceanography

Sherwood Washburn, Professor Emeritus of Anthropology, University of California, Berkeley

Trustee Grants in Cognitive Science

Carnegie-Mellon University **$500,000**
Pittsburgh, Pennsylvania 15213 (over two years)

This university has maintained for many years one of the most productive research groups in cognitive science in the country. It was one of the first institutions to receive a major grant from the Foundation in phase three of our program. Work over the last few years has been concentrated on the development of a cognitive theory of learning and the application of that theory to problems of pedagogy. The learning problems under study have been geometry, algebra, elementary physics, and expository writing, among others. A second area of interest to the Carnegie-Mellon research group has concerned parallel computation. Many important cognitive functions, such as visual pattern recognition, cannot be adequately simulated by conventional computing techniques; thus the group is now addressing the formidable intellectual problems of developing algorithms for parallel processing. Under the terms of our first award of $500,000, the Foundation agreed to consider a renewal request in the same amount if good progress were being made. With the help of outside consultants, the Foundation conducted a careful evaluation of the project last year; the results were strongly positive and a renewal grant of $500,000 was made. (Project director: Herbert A. Simon, University Professor.)

University of Pennsylvania **$500,000**
Philadelphia, Pennsylvania 19104 (over two years)

Like Carnegie-Mellon, the University of Pennsylvania was the recipient early in phase three of a grant of $500,000. Cognitive Science at Penn consists mainly of a number of interdisciplinary research groups concerned with such topics as language acquisition, vision, natural language processing, and perceptual development. These groups are now well established and looking to new areas of research such as

computational perception, language acquisition among blind children, and computational models of discourse. The whole program was reviewed by the Foundation last year, and a renewal grant of $500,000 made. (Project directors: Aravind A. Joshi, Professor of Computer and Information Science; Lila Gleitman, Professor of Psychology; and Rochel Gelman, Professor of Psychology.)

As mentioned above, the last phase of our particular program in cognitive science is concerned with the establishment of centers or departments that promise to give research and education in this field a permanent home on a number of university campuses; but we continue to believe it important at the same time to support smaller projects of special importance, as in the following three grants. It is not a coincidence that they all occupy the borderland between neuroscience (the interdisciplinary field in which the Foundation had an earlier particular program) and cognitive science. Having made large investments in both fields, where the common aim is to explain the mechanisms underlying intelligent behavior, the Foundation has a natural interest in nourishing interaction between them. As cognitive science attempts to deepen its analysis of intelligent behavior, information about the functioning of the central nervous system has an important role to play by suggesting an architecture for cognitive models and providing data that guide researchers in their decisions regarding competing models. Conversely, neuroscience can often be strengthened when the interpretation of neural structure and function is informed by a cognitive analysis of the psychological processes carried out by the nervous system. One arrangement that seems especially well suited to fostering productive interaction between these two groups of researchers is indeed simple — regular meetings of working groups in which no more than a dozen scientists come together two or three times a year to discuss research topics and strategies. The following three Trustee grants are for that purpose:

Johns Hopkins University **$70,000**
Baltimore, Maryland 21218 (over two years)

The study of memory is a central concern in both neuroscience and cognitive science. In neuroscience, memory is studied by neurophysiologists to determine the synaptic changes that underly neural plasticity, by molecular biologists to determine the molecular processes governing synaptic behavior, and by neuroanatomists to locate the major brain centers that mediate memory. In cognitive science, memory is studied by computer scientists interested in building electronic learning systems and by cognitive psychologists trying to understand the performance of the human memory. These lines of research have developed

independently of each other in the past. With this grant, a group of nine researchers representing various specialties from both fields will meet regularly to explore a multi-level approach to the study of memory. (Project director: Neal J. Cohen, Professor of Psychology.)

McGill University **$50,000**
Montreal, Quebec (over two years)
H3A 2B4, Canada

For many years the study of aphasia has been the province of clinical neurologists whose work has been limited by their poor understanding of the processes underlying linguistic performance. The number of cognitive scientists doing research in aphasia is small but growing. This grant will support a series of meetings between neuroscientists and cognitive scientists to plan joint research in aphasia. (Project director: David Caplan, Professor of Neurology and Neurosurgery.)

Salk Institute **$30,000**
P. O. Box 85800 (over one year)
San Diego, California 92138

This grant will also support meetings of researchers on aphasia, in this case those involved in cross linguistic studies in North America, Europe, and Asia. (Project director: Ursula Bellugi, Senior Research Scientist.)

Officer Grants in Cognitive Science

Cold Spring Harbor Laboratory **$21,000**
P. O. Box 534 (over one year)
Cold Spring Harbor, New York 11724

For support of a summer workshop to be attended by neuroscientists and computer scientists on problems of computational neuroscience. (Project director: Michael Shodell, Director of the Banbury Center.)

Northeastern University
Boston, Massachusetts 02115

$19,000
(over one year)

For a conference of linguists and psycholinguists on the structure of American sign language. (Project director: Harlan Lane, Professor of Psychology.)

Rockefeller University
1230 York Avenue
New York, New York 10021

$15,000
(over one year)

For research on a computerized neurophysiological recording system and computer modeling of the visual system. (Project director: Torsten Wiesel, Vincent and Brooke Astor Professor.)

Social Science Research Council
605 Third Avenue
New York, New York 10158

$22,350
(over one year)

For a conference on the interaction between the brain and behavior during human development. (Project director: Lonnie R. Sherrod, Staff Associate.)

Stanford University
Stanford, California 94305

$20,000
(over one year)

For the development of a computer model of the neural system underlying associative learning of vertebrates. (Project director: Richard F. Thompson, Bing Professor of Biology.)

University of Arizona
Tucson, Arizona 85721

$4,500
(over one year)

For a series of lectures on the state of the art in cognitive science. (Project director: Peter W. Culicover, Head, Department of Linguistics.)

University of California, Irvine
Irvine, California 92717

$30,000
(over one year)

For the seventh annual meeting of the Cognitive Science Society. (Project director: Richard H. Granger, Professor of Computer Science.)

University of Colorado
Boulder, Colorado 80302

$25,000
(over one year)

For the sixth annual meeting of the Cognitive Science Society. (Project director: Walter Kintsch, Director of the Institute of Cognitive Science.)

Vassar College
Poughkeepsie, New York 12601

$16,000
(over one year)

For a conference on cognitive science in the undergraduate curriculum. (Project director: Charles I. Bunting, Director of Academic Program Development.)

Two Fellowship Programs for Young Researchers

The Foundation's program known as Sloan Research Fellowships entered its 30th year in 1984, making it by far the oldest program of the Foundation. A smaller, complementary program, the Sloan Dissertation Fellowships, began last year, making it the newest program of the Foundation.

Sloan Research Fellowships
$2,250,000 over two years

Over the last 29 years, this program has grown in size and cost, but its purpose remains the same: to stimulate fundamental research by young scholars of outstanding promise at a time in their careers when their creative abilities are especially high and when federal or other support is difficult to obtain. The program now includes several disciplines not covered at the beginning in 1955, one of which, neuroscience, did not exist at that time. An evaluation of the Sloan Research Fellowships that was carried out a few years ago by the staff of the Foundation, together with the kind of informal evaluation that comes to us in the normal course of events, gives the Foundation confidence in this program as well as satisfaction with the reputation the program enjoys in the academic world.

These yearly awards are now made in five fields: physics, chemistry, neuroscience, economics, and pure and applied mathematics. The value of the awards was raised in 1982 from $20,000 to $25,000; the funds are normally expended by the fellow over a two-year period. The awards are administered by the fellow's institution and are designed to permit him the greatest possible freedom and flexibility in their use. The fellow need not pursue a specified research project and is free to change the direction of his research at any time. The award may be used for equipment, summer support, professional travel, computer time, research assistants, or other purposes approved by the fellow's institution. Former fellows report that this flexibility often gives the awards a value well beyond their dollar amounts. They also report that the early recognition of outstanding promise which the fellowship confers, after years of arduous preparation, is an incomparable stimulus to their careers. A leaflet entitled "Sloan Research Fellowships" gives details about the program and is available free on request.

With the 1984 awards, the Foundation has spent over $40 million since 1955 to assist nearly 2,000 young researchers. Among the alumni of the program are 10 Nobel laureates and many other holders of distinguished awards in their fields. Candidates for Sloan Research Fellowships are nominated by senior scholars familiar with their work. For the 1984 awards, 400 nominations were reviewed by a committee of senior scientists and economists, as follows:

Chemistry
Ronald Breslow, Professor of Chemistry, Columbia University
Robin M. Hochstrasser, Professor of Chemistry, University of Pennsylvania
Richard H. Holm, Professor of Chemistry, Harvard University

Economics
Richard Quandt, Professor of Economics, Princeton University
Michael Rothschild, Professor of Economics, University of California, San Diego
James Tobin, Professor of Economics, Yale University

Mathematics
S.S. Chern, Professor of Mathematics, University of California, Berkeley
Peter D. Lax, Professor of Mathematics, New York University
David Mumford, Professor of Mathematics, Harvard University

Neuroscience
Patricia S. Goldman-Rakic, Professor of Neuroscience, Yale University
Eric R. Kandel, Professor of Neurobiology, Columbia University
Seymour S. Kety, Professor of Neuroscience, Harvard Medical School

Physics
Hans Frauenfelder, Professor of Biophysics, University of Illinois at Urbana-Champaign
Malvin A. Ruderman, Professor of Physics, Columbia University
Kenneth G. Wilson, Professor of Physical Science, Cornell University

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The following scholars, listed by institution and field, received the 1984 awards:

Arizona State University
Chemistry: Krishnan Balasubramanian

California Institute of Technology
Mathematics: Thomas Wolff
Neuroscience: Mark A. Tanouye
Physics: Mark B. Wise

Carnegie Institution of Washington
Physics: Stephen A. Shectman

Central Institute for the Deaf
Neuroscience: Martin S. Silverman

City University of New York, City College
Physics: Stuart Samuel

Columbia University
Chemistry: Jacqueline K. Barton
James Skinner
Economics: Maurice Obstfeld
Mathematics: Ngaiming Mok
Michael Tabor
Physics: Gerald Navratil

Cornell University
Physics: Ira M. Wasserman

Harvard University
Chemistry: Steven A. Benner
Neuroscience: David P. Corey
William D. Matthew
Physics: Paul T.P. Ho

Indiana University
Physics: Steven Paul Ahlen

Iowa State University
Chemistry: Andrew DePristo
Patricia A. Thiel

Johns Hopkins University
Neuroscience: George R. Uhl

Massachusetts Institute of Technology
Mathematics: Rodolfo R. Rosales
Gunther A. Uhlmann
Physics: Edward Farhi

Michigan State University
Mathematics: Michael Handel

New York University
Mathematics: Robert V. Kohn

Northwestern University
Chemistry: Peter C. Stair
Economics: Roger B. Meyerson
Neuroscience: David L. Ferster
Physics: Richard G. Gordon

Ohio State University
Mathematics: Timothy Carlson
Physics: Tin-Lun (Jason) Ho

Pennsylvania State University
Chemistry: Ayusman Sen

Polytechnic Institute of New York
Chemistry: Bruce A. Garetz

Princeton University
Chemistry: G. Charles Dismukes
Economics: Gene M. Grossman
Mathematics: Steven R. Bell
Physics: Laurence G. Yaffe

Rockefeller University
Neuroscience: Colin J. Barnstable

Rutgers University
Mathematics: Igor B. Frenkel
Jeffry N. Kahn
Jerrold B. Tunnell

Stanford University
Economics: Jeremy I. Bulow
Mathematics: Steven P. Kerckhoff
Neuroscience: Richard H. Scheller
J.H. Pate Skene

State University of New York, Stony Brook
Neuroscience: Leslie Craig Evinger
Physics: Steven A. Kivelson

University of British Columbia
Chemistry: Michael D. Fryzuk

University of California, Berkeley
Economics: Drew Fudenberg
Mathematics: John C. Neu
Physics: Werner Hofmann
Alex Zettl

University of California, Irvine
Chemistry: John C. Hemminger

University of California, Los Angeles
Chemistry: R. Stanley Williams
Mathematics: Robert K. Lazarsfeld
Neuroscience: Cameron B. Gunderson
Meyer B. Jackson

University of California, San Diego
Economics: Mark J. Machina
Physics: Jorge E. Hirsch

University of California, Santa Barbara
Chemistry: Bruce H. Lipshutz

University of Chicago
Chemistry: David G. Lynn
Economics: David W. Galenson
Physics: Thomas F. Rosenbaum

University of Colorado
Physics: Carl E. Wieman

University of Connecticut
Neuroscience: Andrew Moiseff

University of Delaware
Chemistry: Lila M. Gierasch

University of Illinois
Chemistry: Dana D. Dlott

University of Maryland
Chemistry: Debra Dunaway-Mariano
Physics: Leo Blitz
Timothy M. Heckman

University of Michigan
Mathematics: Dale H. Peterson
Neuroscience: Richard I. Hume
Pamela A. Raymond

University of Minnesota
Physics: Chandan Dasgupta

University of New Brunswick
Chemistry: Ajit J. Thakkar

University of North Carolina at Chapel Hill
Chemistry: James W. Jorgenson

University of Notre Dame
Mathematics: Pit Mann Wong

University of Pennsylvania
Mathematics: David Harbater

University of Pittsburgh
Economics: Alvin E. Roth
Mathematics: G. Bard Ermentrout

University of Rochester
Chemistry: William D. Jones

University of South Carolina
Chemistry: Steven D. Burke

University of Southern California
Mathematics: Robert W. Brooks
Physics: F. Duncan M. Haldane

University of Texas
Chemistry: Richard A. Friesner
Physics: Paul R. Shapiro

Yale University
Neuroscience: Christie L. Sahley
Physics: Yoram Alhassid

Sloan Dissertation Fellowships
$520,000 over one year

As the federal government reduces its expenditures in fields of interest to the Sloan Foundation, we can do no more than rescue a few of the most valuable projects. Federal support of fellowships for doctoral candidates in the physical and social sciences has declined sharply from its peak in the 1970's. To help fill the gap, we established a new program in 1984, the Sloan Dissertation Fellowships, to help Ph. D. candidates in two fields, mathematics and economics.

Completing the dissertation is usually a time-consuming scholarly task that is performed with great difficulty amidst the candidate's teaching duties and other obligations. These awards will give the fellows the freedom they need to finish their degrees. To launch this new program, the Foundation invited leading departments of mathematics and economics to submit nominations. The nominations were reviewed by the following committee of scholars, who made 40 awards (the number will increase to 50 next year) of $8,000 each plus tuition:

Economics
Alan J. Auerbach, Professor of Economics, University of Pennsylvania
Peter A. Diamond, Professor of Economics, Massachusetts Institute of Technology
Lawrence J. White, Professor of Economics, New York University

Mathematics
F. Thomas Farrell, Professor of Mathematics, Columbia University
Benedict Gross, Professor of Mathematics, Brown University
Robert C. Gunning, Professor of Mathematics, Princeton University

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The following scholars, listed by institution and field, received the 1984 awards:

Brandeis University
Mathematics: Steven Cutkosky

Brown University
Mathematics: Margaret M. Napolitano

California Institute of Technology
Economics: James M. Snyder

Carnegie-Mellon University
Economics: Daniel E. Ingberman

City University of New York
Mathematics: Diego Benardete

Columbia University
Economics: Luis Campos Cunha

Cornell University
Mathematics: Mark F. Simpson

Harvard University
Economics: Adam B. Jaffe
Philippe Weil
Mathematics: Robin Forman
Curtis Tracy McMullen
Mark Spivakovsky

Massachusetts Institute of Technology
Economics: Vassilis A. Hajivassiliou
Christina D. Romer
David Romer
Mathematics: John Stembridge

New York University
Mathematics: Jacob Rubinstein
Eric F. Van de Velde

Northwestern University
Economics: John Vincent Nye
Gregory L. Powell

Princeton University
Economics: George J. Mailath
Duncan Thomas
Mathematics: Samuel R. Buss
Peter Niels Heller
Christopher D. Sogge

Rutgers University
Mathematics: Paulo Cordaro

Stanford University
Economics: William A. Sundstrom
Mathematics: Livio Flaminio

State University of New York, Stony Brook
Mathematics: Salman Abdulali
Da-Gang Yang

University of California, Berkeley
Mathematics: Randall Lee Dougherty
Richard W. Montgomery
Frank S. Rimlinger

University of California, Los Angeles
Economics: David Reiffen

University of Chicago
Mathematics: David Witte

University of Maryland, College Park
Economics: Robert Gillette
Mathematics: Howard N. Weiss

University of Michigan
Mathematics: Gaven J. Martin

University of Minnesota, Twin Cities
Mathematics: Lin Fangua

University of Washington
Mathematics: Franc Forstneric

Science, Technology, and Mathematics

We have restricted our support in recent years of science and engineering, two fields of traditional interest to the Sloan Foundation. The costs of research and education in mainstream science and engineering are now well beyond our financial range and have become the responsibility of government, industry, and the institutions themselves. In these fields, we occasionally support projects and activities for which private financing is especially desirable, such as those having to do with public policy; but our main support of science and engineering must continue to be through our cognitive science and science fellowships programs.

We do give substantial support to engineering indirectly through our New Liberal Arts Program (reviewed above), which is concerned with non-engineering students. Instruction in technology and the principles of engineering for undergraduate students who are majoring in the humanities and social sciences is a central part of that program. But the program involves only a handful of engineering educators working in a non-traditional area of engineering — an area of great difficulty and complexity but not generally regarded as conventional engineering.

In applied mathematics our activities continued last year on a modest scale. Grants in this field complement those in the New Liberal Arts Program and will often produce instructional materials useful not only to the grantee but to the colleges taking part in the New Liberal Arts Program.

Trustee Grants in Science, Technology, and Mathematics

National Academy of Sciences — **$454,000**
2101 Constitution Avenue — (over two years)
Washington, D. C. 20418

The nation's system of federal support for scientific research took shape in somewhat haphazard fashion after the Second World War and since that time has grown greatly but irregularly. The system is now beset with problems of slow or no growth as well as with problems having to do with the relationships between researchers and funding agencies. In 1982 the Foundation made a grant of $359,000 to the National Academy of Sciences to support a special panel appointed by the Academy to review government-university relations. The panel's report was issued in 1983, recommending that a standing group be established for a trial period to undertake a

sustained analysis of the federal support system and attempt to guide its future. The present grant will meet part of the costs of the Academy's Government-University Research Roundtable, a body that will consider the range of issues that trouble the two parties, such as the mechanisms for accounting for funds, the problems of insuring scientific integrity, the procedures for exposing scientific fraud, and the standards for reviewing proposals. Although the main concern of the Roundtable will be with government-university relations, it will also give attention to the growing interactions between universities and private industry. Industry's contribution to the university's research budget is modest but growing; and it raises important questions with respect to the commingling of federal and private funds, the ownership of intellectual property, restrictions on publication, and the influence of corporate funding on the direction of scientific and technological research. (Project director: Frank Press, President.)

Harvey Mudd College — **$300,000**
Claremont, California 91711 — (over two years)

Although industrial support of research in science and engineering is growing, the same is not true of mathematics; American industry rarely turns to institutions of higher education for help in solving mathematical problems. One exception is the Mathematics Clinic that has been in operation at the Claremont Colleges (mainly at Harvey Mudd College and the Claremont Graduate School) for the last 10 years. This program, modeled on Harvey Mudd's highly successful Engineering Clinic, brings together academic mathematicians, industrial mathematicians, and undergradutes majoring in mathematics. Together they try to solve problems in applied mathematics brought to them by industry or government. That the clinic is effective is demonstrated by the number of satisfied clients and the fees they are willing to pay; that it is successful for undergraduates is demonstrated by its waiting list of students. The principal barrier to expanding this kind of clinic to other institutions is the lack of experience on the part of academic mathematicians. This grant will enable mathematicians from other campuses to spend a sabbatical year or a shorter period gaining experience in the Mathematics Clinic and possibly developing plans for establishing a clinic at their home institutions. (Project directors: Robert Borrelli and Stavros Busenberg, Professors of Mathematics at Harvey Mudd College.)

Princeton University Press — **$280,150**
Princeton, New Jersey 08540 — (over five years)

The publication of Albert Einstein's papers is a project of obvious importance now well launched at the Princeton University Press. *The Collected Papers of Albert Einstein* will be a comprehensive 35-volume publication of his writings and correspondence, edited by John Stachel, Professor of Physics at Boston University. These writings will be printed in their original languages, mainly German, and annotated in En-

glish. The Foundation made a grant in 1978 of $150,000 and in 1981 of $120,000 to support the preliminary work of collecting manuscripts and developing a computerized index; this third grant will meet the editing and publishing costs of volumes based on the early period of Einstein's scientific career (1901-1916) when he worked in the Swiss Patent Office and held chairs in Zurich and Prague, a period during which many of his most important papers were published, including those on the special and general theories of relativity, the quantum theory, and statistical mechanics. (Project director: Herbert Bailey, Director of the Princeton University Press.)

Massachusetts Institute of Technology **$250,000**
Cambridge, Massachusetts 02139 (over one year)

Two years ago, the Foundation helped establish the Vannevar Bush Fellowships at M.I.T. with a grant of $250,000. This program brings to M.I.T. for a year a small group of practicing journalists with some experience in writing for a lay audience about science and technology. Known as Vannevar Bush Fellows, they receive an intensive year of work in science and technology tailored to the needs of working journalists. The first group of fellows, a group of outstanding ability, completed their year of work in 1983. They gave as much to M.I.T. as they got: they learned a great deal about the state of the art in science and technology, and made contacts that will help their newsgathering and reporting; and M.I.T. found a way of opening new pathways for explaining its work to the public. This renewal grant will provide partial support for the second group of fellows and for many of the activities of the program. (Project director: Victor McElheny, Director of the Vannevar Bush Fellowships in the Public Understanding of Technology and Science.)

Clarkson College **$158,000**
Potsdam, New York 13676 (over two years)

The Foundation made a grant of $216,000 to Clarkson in 1983 to test the idea that academic mathematicians, after two summer workshops in computing and an intervening year of work on their home campuses, could teach most of the undergraduate courses offered by their institutions in computer science. If successful, such a program would be of substantial help to institutions of higher education, particularly colleges, that cannot compete in the marketplace for scarce and expensive computer scientists. The program was an outstanding success and can probably become self-sustaining in the future through fees paid by the participants. This second grant is for special purposes, mostly for the support of minority participants whose institutions cannot meet the full costs of the program. (Project director: Edward Dubinsky, Professor of Mathematics and Computer Science.)

Cold Spring Harbor Laboratory **$162,000**
P. O. Box 534 (over three years)
Cold Spring Harbor, New York 11724

As part of our effort to improve the public's understanding of science, the Foundation made grants of $100,000 in 1978 and 1979 to help support a series of workshops at Cold Spring Harbor Laboratory on important scientific topics and issues. These workshops were mostly on risk assessment and were attended by science writers, congressional staff aides, and federal administrators. The format for these workshops is now well-established: each workshop concentrates over a weekend on a single scientific topic identified in advance by the group taking part; five or six lectures by leading scientists in the field are delivered; and time is made available for informal discussion. Workshops to date have been held on environmental health risks, recombinant DNA, carcinogenesis, genetic mutation, and new techniques for biological scanning. The problem of presenting inherently complex scientific information to non-specialists is a very difficult one; but this program seems to have found one way of doing it well. This renewal grant will meet the cost of six new workshops, three for federal personnel and three for science journalists. (Project director: Michael Shodell, Director of the Banbury Center.)

Association for Symbolic Logic **$106,000**
Yale University (over five years)
New Haven, Connecticut 06520

A team of distinguished logicians led by Solomon Feferman, Professor of Mathematics at Stanford University, has been at work irregularly for several years translating and annotating the works of Kurt Gödel, the greatest name in mathematical logic. This grant will provide partial support for putting the work on a regular schedule. (Project director: Professor Feferman.)

University of Rochester **$75,000**
Rochester, New York 14627 (over one year)

Not much is known about the application of cognitive learning theory to the teaching of mathematics; but at a time when the federal government is poised to spend large sums of money to improve mathematics in the public schools, an exploration of what learning theory has to offer mathematics may be useful. This grant will meet the costs of a conference at which learning theorists, mathematicians, and mathematics educators will attempt to determine how they can help one another. (Project director: Alan H. Schoenfeld, Professor of Mathematics and Education.)

Officer Grants in Science, Technology, and Mathematics

American Mathematical Association of Two-Year Colleges — **$30,000**
Santa Rosa Junior College — (over two years)
Santa Rosa, California 95401

For two summer workshops to enrich the professional education of faculty members from the departments of mathematics of two-year colleges. (Project director: Amber M. Steinmetz, President.)

Association for Symbolic Logic — **$20,000**
Yale University — (over one year)
New Haven, Connecticut 06520

For preliminary work on the translation and publication of the mathematical work of Kurt Gödel. (Project director: Solomon Feferman, Professor of Mathematics, Stanford University.)

Boston University — **$10,000**
Boston, Massachusetts 02215 — (over one year)

Partial support for a conference on the mathematics of chaotic systems. (Project director: Dennis D. Berkey, Associate Vice President for Academic Affairs.)

Brown University — **$17,700**
Providence, Rhode Island 02912 — (over one year)

Partial support for a book on the philosophy of computing and on the computer in mathematics education. (Project director: Philip J. Davis, Professor of Mathematics.)

Clarkson College — **$8,000**
Potsdam, New York 13676 — (over one year)

For special sessions on computer science at the annual meeting of the Mathematical Association of America. (Project director: Edward Dubinsky, Professor of Mathematics and Computer Science.)

Cornell University — **$19,000**
Ithaca, New York 14853 — (over two years)

For the development of a computer-assisted course in physical mechanics for first-year physics students. (Project director: Donald F. Holcomb, Professor of Physics.)

Mathematical Association of America — **$7,000**
1529 Eighteenth Street, N. W. — (over two years)
Washington, D. C. 20036

For a study of the problems of college freshmen in making the transition from high school courses in calculus to college courses in calcalus. (Project director: Donald Small, Professor of Mathematics, Colby College.)

National Research Council — **$20,000**
2101 Constitution Avenue — (over one year)
Washington, D. C. 20418

For a workshop on the topic, "Teaching about the Role of Science and Technology in Foreign Affairs." (Project director: Victor Rabinowitch, Executive Director, Office of International Affairs.)

Northwestern University — **$12,000**
Evanston, Illinois 60201 — (over one year)

Partial support for a conference on reducing the costs of library collections in science and engineering through new technologies. (Project director: Allen Batteau, Acting Director, Committee on Institutional Cooperation.)

Oberlin College — **$16,000**
Oberlin, Ohio 44074 — (over one year)

For a conference on research and teaching in science in liberal arts colleges. (Project director: S. Frederick Starr, President.)

Pennsylvania State University — **$10,000**
University Park, Pennsylvania 16802 — (over one year)

For completion of a book on the organization and financing of research in science and engineering. (Project directors: Rustum Roy, Chairman of the Science, Technology and Society Program at Pennsylvania State University; and Deborah Shapley, Visiting Scholar, Georgetown University Center for Strategic Studies.)

Princeton University — **$13,000**
Princeton, New Jersey 08544 — (over one year)

For the preparation of an oral history of mathematics at Princeton University in the 1930's, a period when the university and the Institute for Advanced Study became a world center in mathematics. (Project director: Charles C. Gillispie, Dirctor of the Program in the History of Science.)

Universities Research Association, Inc.
1100 Connecticut Avenue, N. W.
Washington, D. C. 20036

$30,000
(over one year)

Partial support for an international symposium on the history of particle physics in the 1950's. (Project director: Leon Lederman, Director, Fermi National Accelerator Laboratory, Batavia, Illinois 60510.)

University of Maryland
College Park, Maryland 20742

$3,600
(over one year)

For preliminary work on a program to celebrate the tri-centennary of the publication of Newton's *Principia*. (Project director: Susan Zimmerman, Executive Director, Center for Renaissance and Baroque Studies.)

University of Minnesota
Minneapolis, Minnesota 55455

$11,000
(over one year)

Partial support for a conference on the history and philosophy of mathematics, to be attended by mathematicians, philosophers, and historians. (Project director: Merlin Garlid, Assistant Director for Research Administration.)

University of Washington
Seattle, Washington 98195

$19,000
(over two years)

Partial support to allow Lillian McDermott, Professor of Physics, to continue her research in physics education while on temporary assignment with the National Science Foundation.

Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

$8,000
(over one year)

Partial support for a conference of engineering schools on problems related to the requirement that all engineering students purchase a personal computer. (Project director: Paul E. Torgersen, Dean, School of Engineering.)

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

$20,000
(over one year)

For a special issue of the journal, *Oceanus*, on the subject of exclusive economic zones. (Project director: John H. Steele, Director.)

Economics and Management

The Foundation followed its accustomed practice in economics and management last year. Our activities in economics were substantial, as they have been for some years; in management, they were minimal, as has also been true for some years. We retain the term, economics and management, for this section of our report only because many of the grants reviewed below, although mainly support for research in economics, inevitably touch upon problems of management as well. Our seeming neglect of management education is simply a reflection of the good financial health this field fortunately enjoys and the availability of other funds with which its needs are met. The Foundation has been active for many years in "public management," and our grants in that program are reviewed elsewhere in this report.

Trustee Grants in Economics and Management

Microeconomics Workshops
$850,000

This group of grants brings to an end the Foundation's program in support of microeconomics workshops. The program began in 1977 after a long planning period that identified research in applied microeconomics as the most promising area of economics for the Foundation to support, and the most in need. The first round of grants went to 10 leading departments of economics that had entered a competition for these awards; the first grants were made for three years and were followed by renewal grants of two years. In each case the grant supported a workshop that dealt with a family of microeconomics problems and gave support to doctoral candidates taking part in the workshop. We hoped and expected the first phase of the program to produce several hundred Ph.D.'s from the nation's leading economics departments. It would be these young scholars who would become faculty members in colleges and universities throughout the country, conducting significant research themselves and in turn stimulating new students of economics and new interests in microeconomics among those who would be headed for careers in industry and government.

Phase one was a marked success: it produced a rich stream of scholarly papers and dissertations; it made major contributions to the development of a systematic, coherent body of knowledge about a number of important microeconomic problems; and it trained a large number of scholars whose principal research interest was in applied microeconomics. Given this record in phase one, the Foundation moved into phase two in 1980 with grants to 12 departments of economics. These grants were followed by renewals to seven institutions in 1983 and to the remaining five institutions in 1984.

These final grants bring to about 500 the number of doctoral candidates who have received dissertation fellowships in 23 workshops at 17 universities. The Foundation's total expenditures in the program have been $8,685,000. The following institutions received renewal grants of $170,000 last year; the grant in each case is for two years and the project director is a professor of economics:

Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213
Workshop on industrial organization, transaction costs, and related conceptual developments linking theory and actual markets. (Project director: Robert M. Townsend.)

University of California, Los Angeles
Los Angeles 90024
Workshop on the economics of transaction-contracting costs and the implications for industrial organization. (Project director: Benjamin Klein.)

University of Maryland
College Park, Maryland 20742
Workshop on the relationships between the structure of the private and the public sectors of the urban economy. (Project director: Wallace E. Oates.)

University of Pennsylvania
Philadelphia, Pennsylvania 19104
Workshop on transaction cost economics, intermediate modes of organization, and contract analysis. (Project director: Andrew Postelwaite.)

Yale University
New Haven, Connecticut 06520
Workshop on financial markets and intertemporal resource allocations. (Project director: William Nordhaus.)

An evaluation of the microeconomics program was conducted for the Foundation in 1984 by Paul Joskow, Professor of Economics at M.I.T., who found, among other things, that the format of the doctoral-candidate workshop

led by senior professors was singularly successful. Although the above grants mark the end of the Foundation's support of workshops in microeconomics research, we will in all probability retain the mechanism of the workshop in our future activities in economics.

Other Trustee Grants in Economics and Management

American Enterprise Institute for Public Policy Research — **$300,000**
1150 Seventeenth Street, N. W. — (over three years)
Washington, D. C. 20036

In 1983, the American Enterprise Institute launched an ambitious research program called "Competing in a Changing World Economy," whose purpose is to analyze the most important factors governing the ability of the United States to prosper in a world economy that is increasingly competitive. Research will concentrate on the following broad areas of problems: (a) the innovation process and economic growth; (b) the impact of defense R&D expenditures on scientific research and innovation; (c) international competition in high-technology industries; (d) the agricultural support system; and (e) human resources for a technologically advanced society. In recent years, A.E.I. has sponsored important research in science and technology policy. For the present project, it has brought together an outstanding group of scholars and researchers. "Competing in a Changing World Economy" is a multi-year, multi-million-dollar undertaking, one large segment of which is focused on science and technology policy. Our grant was made in partial support of this segment. (Project director: Claude E. Barfield, Jr.)

Yale University — **$300,000**
New Haven, Connecticut 06520 — (over three years)

The Yale School of Organization and Management has assembled a group of faculty members uniquely qualified to advance the study of an area of economics that has been neglected but is now recognized as important: the economics of organization. In formal economic theory, the business firm is something of an abstraction, a mere collection of resources such as labor and capital. With a more detailed modeling of decision-making within the firm, our understanding of real markets and industries can grow. With this grant, the Yale group will address such questions as: Why do firms make some things inside the organization and purchase others outside? Why do some firms stay within narrowly defined industrial boundaries while others diversify? Why do some firms avoid price competition while others aggressively use low prices to enlarge market share? To examine these kinds of questions and to search for a coherent theory of firm and market organization, the Yale group will rely on four complementary tools of analysis: the theory of organization; transaction cost economics; evolutionary economics; and strategic behavior. (Project director: Burton G. Malkiel, Dean of the School of Organization and Management.)

Brookings Institution — **$250,000**
1775 Massachusetts Avenue, N. W. — (over two years)
Washington, D. C. 20036

The Brookings Panel on Economic Activity was established in 1970 with the aid of a $300,000 grant from the Foundation. Since that time, the Panel has been financed by grants from the National Science Foundation, internal funds, and further grants from Sloan. The Panel's purpose remains what it was at the beginning: to generate and publish high-quality research on macroeconomic problems of current concern. The Panel shuns abstract, theoretical modeling of economic relationships that cannot be tested against data and experience. It stimulates research to explore fundamental characteristics of the economy and of how the economy responds to government policies, as well as applied research to clarify and quantify economic relationships. The Panel has earned a superlative reputation for the timeliness and quality of its work, and economists generally agree that its disappearance would be a serious loss. This grant will meet part of the costs of the Panel over two years. (Project director: Alice M. Rivlin, Director, Economic Studies Program.)

National Bureau of Economic Research — **$250,000**
1050 Massachusetts Avenue — (over two years)
Cambridge, Massachusetts 02138

Unionism and collective bargaining in the United States have been declining in the private sector but growing in the public sector. Although a considerable literature exists on the subject of public-sector unionism, we still have no general summary of the field. Two years ago, the Foundation commissioned a paper by Richard A. Freeman of the National Bureau of Economic Research in which he reviewed the literature on public-sector unionism and did some preliminary research of his own. The main hypothesis of his paper was that public-sector unionism has raised wages less than private-sector unionism, but has expanded public employment where unions are strong. This grant will enable Mr. Freeman, together with several associates, to expand and test his hypothesis. They plan to investigate the influence of public-sector unions on wages, productivity, turnover, and municipal finances. They will also explore strikes and the outcome of strikes in the public sector. Most of the work will be quantitative, making use of large data sets available at N.B.E.R.

Urban Institute — **$240,000**
2100 M Street, N. W. — (over two years)
Washington, D. C. 20037

The controversy that surrounds proposals for "comparable worth" and "equal pay for comparable work" usually generates more heat than light. The goal of those advocating the idea is to make unlawful any wage gap between men and women. Comparable worth policies would require that wages be set according to job evaluations of different occupations, with "comparable" jobs to be paid equal wages, whatever the wage level set by the market. Given the high level of political and judicial activity on this labor-market issue, the need for serious and balanced economic analysis is evident. This grant will support a research program centered on two broad questions: Why have some occupations become predominantly female, and why do wages in these occupations tend to be lower than in male-dominated occupations? And what economic consequences could be expected from a wide implementation of comparable worth policies? (Project director: June A. O'Neill, Director, Program of Policy Research on Women and Families.)

National Bureau of Economic Research — **$200,000**
1050 Massachusetts Avenue — (over three years)
Cambridge, Massachusetts 02138

The women's movement has effected dramatic changes over the last 20 years in our laws, behavior, and expectations. Economic growth and technological change have reduced the differences between the male and female roles at home and on the job. Even so, the issue of equality remains largely unresolved, both analytically and in terms of public policy. To examine this set of issues, N.B.E.R. has begun a research project under the direction of Victor R. Fuchs, Professor of Economics at Stanford University. Among the questions he will examine are: What progress have women made in the labor market in the past 20 years? How has that progress varied among women according to race, education, age, and other characteristics? What are the obstacles to further progress? What legal actions under existing laws or what new legislation would benefit women economically? What are the probable economic and social effects of various actions and policies? The principal product of Mr. Fuchs's work will be a book with the style and structure of his earlier, best-selling studies, *Who Shall Live?* and *How We Live*.

Harvard University — **$100,000**
Cambridge, Massachusetts 02138 — (over two years)

This grant provides partial support for the university's Migration and Development Program, a program of research and instruction that is attempting to apply the discipline of economics to the phenomenon of human migration. Two lines of research are being pursued. The first concerns the relationships between international migration and internal migration; what, for example, are the economic factors affecting the "secondary" migrations of Cuban and Vietnamese refugees in the United States, from wide dispersal around the country to re-concentrations in South Florida and Southern California? The second area of research applies economic concepts and models to refugee movements, which heretofore have been analyzed by political scientists and sociologists. Such movements are being studied in a market

framework in which the status of refugees may become a substitute for the more conventional status of immigrant when the latter becomes less available and thus more "costly." (Project director: Oded Stark, Director of the Migration and Development Program.)

Economic Alliance for Michigan — **$75,000**
First National Building — (over two years)
Detroit, Michigan 48226

This organization was formed in 1982 to mobilize union and business leaders throughout Michigan to attack the difficult economic problems confronting that state. To date the organization has concentrated its efforts on such problems as the state's fiscal crisis; the unemployment compensation system; the rapid escalation of medical costs; the unavailability of venture capital in the state; and the decreasing volume of federal contracts awarded Michigan firms. This grant will help the Alliance enlarge its activities and in particular mount a program to expand enrollments in Health Maintenance Organizations as a promising way of reducing the costs of health care. (Project director: S. J. Axelroad, Staff Director, Health Committee, and Professor Emeritus, School of Public Health, University of Michigan.)

Yale University — **$69,000**
New Haven, Connecticut 06520 — (over three years)

Richard Ruggles, Professor of Economics at Yale, and Nancy Ruggles, Senior Research Economist, are leading authorities on national income accounting. They have developed a new system for integrating economic accounts for the United States that corrects some major defects in the official National Income and Product Accounts. This grant will meet part of their expenses in writing a book to be called *Events and Economic Policy in the United States*, based on data in their new accounts.

In addition to the above grants, the Trustees approved an internal appropriation last year of $250,000 for a program in behavioral economics, an emerging interdisciplinary field concerned with economic behavior that appears irrational. Economists traditionally have based much of their research on the assumption that individuals make "rational" economic decisions; that they act to maximize returns. The assumption that economic man is always rational has been challenged often, but only recently have scholars in psychology and other disciplines been able to demonstrate systematic departures from rationality. These departures suggest the economic world may be populated by consumers who, for example, fail to ignore sunk costs; by security analysts whose earnings estimates

make insufficient allowance for regression to the mean; by workers in dangerous occupations who consistently underestimate their risks; and by medical policy makers whose attitude toward risk depends on whether a treatment's effects are framed in terms of lives saved or lives lost. The Foundation's staff, while recognizing the elusive and speculative character of behavioral economics, will use this appropriation to support small exploratory studies as opportunities present themselves.

Officer Grants in Economics and Management

Cornell University — **$36,000**
Ithaca, New York 14853 — (over one year)

A grant taken from the behavioral economics appropriation (see above) to enable Professor Richard Thaler of the Cornell Graduate School of Management to pursue a research project in this field.

National Bureau of Economic Research — **$30,000**
1050 Massachusetts Avenue — (over one year)
Cambridge, Massachusetts 02138

Partial support for a conference and for the production of a book on business cycles. (Project director: Eli Shapiro, President.)

Princeton University — **$8,000**
Princeton, New Jersey 08544 — (over one year)

Partial support for American participants in a conference at Peking University, the purpose of which is to teach Western neo-classical economics to mainland Chinese. (Project director: Gregory C. Chow, Professor of Economics.)

Rutgers University Foundation — **$23,500**
New Brunswick, New Jersey 08903 — (over one year)

For a conference on behavioral economics to be attended by academic and industrial economists. (Project director: Benny Gilad, Professor of Economics, Rutgers University.)

Rutgers University Foundation — **$3,000**
New Brunswick, New Jersey 08903 — (over one year)

Partial support for a study of the economic impact of comparable worth, to be conducted by Mark R. Killingsworth, Professor of Economics, Rutgers University.

University of British Columbia **$3,500**
Vancouver, B. C., Canada V6T 1W5 (over one year)

For a collaborative research project on judgment, decision making, and behavioral economics. (Project director: Daniel Kahneman, Professor of Psychology.)

University of New Hampshire **$20,000**
Durham, New Hampshire 03824 (over one year)

Renewal and final support for a study of the history of employee ownership in the United States. (Project director: Professor Michael Conte, Whittemore School of Business and Economics.)

University of Texas, Austin **$20,000**
Austin, Texas 78712 (over one year)

For a study of the seasonal farm labor market in Texas and California. (Project director: Robert W. Glover, Director of the Center for the Study of Human Resources.)

University of Wisconsin, Madison **$18,000**
Madison, Wisconsin 53706 (over one year)

For start-up costs of a data center for the Income Survey Development Program and the Survey of Income and Program Participation. (Project director: Martin David, Professor of Economics.)

Education and Research in Public Management

Support for education and research in the management of government — a field also known as public policy, public management, or education for the public service — has been a major activity of the Foundation for the last eight years. In the earlier years of our program, Sloan grants helped establish a number of degree programs at the graduate level and a number of course sequences at the undergraduate level. In 1981 we began to concentrate our support on two complementary kinds of activity in the public management field: research and minorities. By that time an adequate variety of programs and experimental curricula had been developed; and in fact the public management program on many campuses had become firmly established and stable by 1981. It seemed to us and to leaders in the field that the most pressing needs then were the development of a strong base of research upon which instruction in public management could stand, and the development of a systematic effort to increase the flow of minority students into these high-quality courses of study.

For the last four years most of our grants in public management have been aimed at these two goals, with an increasing proportion of the funds going to the minorities part of the program. So substantial had the minorities program become by 1984 that it had taken on all the characteristics of a "particular program" (see the front matter of this report for a discussion of our particular programs). Last year it therefore became the first of our seven particular programs to have achieved that status through a process of evolutionary growth; the other six started life as particular programs. The Foundation was again assisted in its public management program, as we have been in previous years, by the Association for Public Policy Analysis and Management (APPAM), an organization made up of leading individuals and institutions in the field.

Particular Program for Minorities in Public Management

Trustee Grants
$1,981,000

Seven APPAM Post-Junior Year Summer Institutes **$658,000**
(over one year)

Two APPAM Post-Senior Year Institutes **$374,000**
(over one year)

In 1984 we provided our fifth year of support for these institutes, jointly developed by APPAM and the Foundation, whose goal is to increase the number of minorities

in positions of authority in government, especially state and local government. To facilitate the flow of promising minority students into new and demanding degree programs in public management, APPAM gives them special academic support and counseling as undergraduates. This support is provided through an intensive eight-week summer residential institute where instruction is concentrated in economics, applied mathematics, and communication skills. The student attends the institute between his junior and senior college years, and may attend another, higher-level institute in the summer after his undergraduate degree and before enrolling in an APPAM graduate school. The Foundation supported seven post-junior year institutes last year, each at $90,000, at the following APPAM schools:

Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213
(Project director: Brian J. L. Berry, Dean of the School of Urban and Public Affairs.)

State University of New York, Stony Brook
Stony Brook, New York 11794
(Project director: Thomas Sexton, Professor of Policy Analysis and Public Management.)

University of California, Berkeley
Berkeley, California 94720
(Project director: Allan P. Sindler, Dean of the Graduate School of Public Policy.)

University of Michigan
Ann Arbor, Michigan 48109
(Project director: Paul N. Courant, Director of the Institute of Public Policy Studies.)

University of Minnesota
Minneapolis, Minnesota 55455
(Project director: John Brandl, Professor of Public Affairs and Planning.)

University of Texas, Austin
Austin, Texas 78712
(Project director: Richard Schott, Professor of Public Administration.)

University of Washington
Seattle, Washington 98195
(Project director: Eric Wolters, Associate Dean of the Graduate School of Public Affairs.)

The two post-senior year institutes last year were conducted in the same mode as the post-junior year institutes; they covered the same subjects but at an advanced level. As in previous years, the post-senior year institutes were restricted to students of particular promise who had successfully completed one of the post-junior year institutes and had been accepted by an APPAM school for enrollment in a graduate program in the fall of 1984. APPAM students now in graduate school continue to give high ratings to the summer institutes they attended, crediting them with making it possible for the participants to compete in graduate programs that are demanding and strenuous. The two post-senior year institutes were conducted at Harvard University where 58 minority students were enrolled at a cost of $240,000, and at the Rand Corporation where 18 were enrolled at a cost of $134,000:

Harvard University
Cambridge, Massachusetts 02138
(Project director: Ronald F. Ferguson, Director, APPAM Summer Institute, John F. Kennedy School of Government.)

Rand Corporation
1700 Main Street
Santa Monica, CA 90406
(Project director: Charles Wolf, Dean of the Rand Graduate Institute.)

Graduate Fellowship Support for Minority Students

Duke University — **$947,000**
Durham, North Carolina 27706 — (over one year)

The third element of our program for minorities in public management is fellowship support for those students who successfully complete one of the post-senior year institutes and gain admission to an APPAM graduate program. The Foundation's support meets the cost of their first year of graduate school, after which they are expected to finance their second year in the same manner as do other students at the institutions they are attending. The Foundation's expenditures in this part of our minorities program have risen steadily in response to the increasing number of students qualifying—one indication of the program's effectiveness. The 1984 grant

supported 86 students, an increase from 70 the year before; 60 percent were black, 30 percent Hispanic, and 10 percent Asian-American. Almost half were women. The grant last year was administered by Duke on behalf of 17 APPAM schools. (Project director: Robert Behn, Director of the Institute of Policy Sciences and Public Affairs.)

An internal appropriation of $28,000 was approved by the Sloan Trustees in 1984 to meet the costs of a coordinating office at the Foundation devoted to the particular program in public management.

Other Trustee Grants in Public Management

Harvard University **$275,000**
Cambridge, Massachusetts 02138 (over three years)

The Foundation made a grant of $300,000 to Harvard in 1981 to support a program of research and curriculum development at the Kennedy School of Government, one of the premier schools of management in the country. The Kennedy School originally based its rigorous curriculum on applied economics, statistics, and other quantitative skills. Later it recognized that it had to devote the same time and resources to the managerial side of government, where "optimal" policies, buttressed as they might be by skillful analysis, had to be implemented through large bureaucracies on a day-by-day basis. Our first grant supported a project to redress this imbalance in research and instruction. Work was done on such topics as strategic planning in government, performance and accountability, negotiation, and financial management. At the heart of much of this research was the question, "Why are some government agencies effective while others are not?" Excellent progress toward answering this complex question has been made by a group at the Kennedy School under the direction of Mark H. Moore, Guggenheim Professor of Criminal Justice Policy and Management. The present grant represents renewal and final support for this program of research and curriculum development.

National Conference on Social Welfare **$200,000**
1730 M Street, N. W. (over two years)
Washington, D. C. 20036

A major area of research in public management concerns the relative efficiency of public and private services and of the most appropriate level of government — federal, state, or local — for the carrying out of certain kinds of programs and

responsibilities. This grant will help the National Conference on Social Welfare conduct a program of research and publication in this area of public management. Special attention will be given to problems of intergovernmental relations; to the stresses likely to be placed on different levels of government by such evolving national issues as aging and long-term unemployment; and to problems related to the "new federalism." (Project director: Alan Pifer, President Emeritus of the Carnegie Corporation.)

Officer Grants in Public Management

Manpower Demonstration Research Corporation **$30,000**
Three Park Avenue (over one year)
New York, New York 10016

Partial support for a study of the effectiveness of current state-level programs designed to increase the employment of welfare recipients. (Project director: Barbara Blum, President.)

Urban Institute **$15,000**
2100 M Street, N. W. (over one year)
Washington, D. C. 20037

For the preparation of scholarly papers on concepts and methods in policy analysis. (Project director: Lester M. Salamon, Director of the Center for Governance and Management Research.)

Vanderbilt University **$20,000**
Nashville, Tennessee 37212 (over one year)

For a study of entrepreneurship in public and governmental institutions. (Project director: Erwin C. Hargrove, Director of the Institute for Public Policy Studies.)

Yale University **$26,000**
New Haven, Connecticut 06520 (over one year)

For a conference on law, economics, and organization, and on new ways in which these fields might be treated in a curriculum. (Project director: Burton Malkiel, Dean of the School of Organization and Management.)

Other Grants and Activities

In this section we review grants and activities that are related to the main interests of the Foundation but for one reason or another stand apart from a specific program or from our support of work in particular academic fields.

Arms Control and Defense Policy—Trustee Grants

Although the Foundation does not have an organized program in arms control and defense policy, our support of research and teaching in this field increased last year, stimulated by small exploratory grants made in previous years. Many other foundations are now active in this field as well; thus we believe it important for Sloan's role to be carefully defined and limited. That role is mainly in support, directly or indirectly, of undergraduate instruction.

Massachusetts Institute of Technology **$170,000**
Cambridge, Massachusetts 02139 (over one year)

In response to the urgent concern of students and the general public with arms control and nuclear weapons, colleges and universities have been hastily developing new courses in this field. Faculty members who teach these courses come frequently from the social sciences and are anxious to deepen their own knowledge of the history of arms control and the technology of nuclear weapons. Even faculty members from the sciences and engineering realize their need for expert instruction in many areas of the field to make them competent to teach the subject themselves. The Foundation made a grant of $162,000 to M.I.T. in 1983 under our New Liberal Arts Program to finance a summer workshop for faculty members from the new liberal arts colleges on arms control and nuclear technology. Based on our successful experience in that project, the Foundation made this renewal grant in 1984 under our general program rather than the New Liberal Arts Program. (Project director: Jack Ruina, Professor of Engineering and Computer Science.)

University of California, San Diego **$110,000**
La Jolla, California 92093 (over one year)

This grant supported a workshop last summer on the West Coast that was twin to the one described above at M.I.T. The West Coast workshop had been conducted with internal funds in 1983 at the University of California, Santa Barbara, under the auspices of the University of California's Institute on Global Conflict and Cooperation. The 1983 workshop was restricted to faculty members from the University of California; the 1984 workshop, with the help of this grant, was

opened to faculty members from a wide range of institutions. (Project director: Herbert F. York, Director of the Institute on Global Conflict and Cooperation.)

Harvard University **$86,300**
Cambridge, Massachusetts 02138 (over one year)

The Center for Science and International Affairs at Harvard is attempting to train a new generation of specialists in arms control and international security; and the recruitment and support of research fellows is its most important activity. Over the last decade, the center has accommodated 114 fellows, who came there to engage in a program of teaching, research, seminars, conferences, and collaborative projects. This grant will support the center's fellowship program for physical scientists. (Project director: Paul M. Doty, Director of the Center for Science and International Affairs.)

Arms Control and Defense Policy—Officer Grants

American Academy of Arts and Sciences **$29,500**
136 Irving Street (over one year)
Cambridge, Massachusetts 02138

For a study of nuclear weapons and international security. (Project directors: Abram Chayes, Professor of Law, Harvard Law School; and George Rathjens, Professor of Political Science, M.I.T.)

Cornell University **$20,000**
Ithaca, New York 14853 (over one year)

Partial support for a visiting fellow in the Peace Studies Program. (Project director: Judith Reppy, Director of the Peace Studies Program.)

University of Miami **$20,000**
Coral Gables, Florida 33124 (over one year)

For a program of visiting lecturers in a new course entitled *Nuclear War-Nuclear Peace.* (Project director: Behram N. Kursunoglu, Director of the Center for Theoretical Studies.)

University of Missouri **$20,000**
Kansas City, Missouri 64110 (over one year)

Partial support for the final stages of work on a narrative history of the development of the atomic and hydrogen bombs, by Richard Rhodes, an independent writer and journalist.

WGBH Educational Foundation **$20,000**
125 Western Avenue (over one year)
Boston, Massachusetts 02134

Partial support for a program on scientific cooperation and its impact on the prevention of nuclear war. (Project director: Terry Rockefeller, Producer.)

Experiments in Video History

Last year was the fourth year of our development work in what we have called video history. The term signifies the use of video technology to extend and enrich our national memory; and to capture the recollections of individuals who were involved in events or enterprises of importance to the country and the world. The technique we use may suggest a video version of oral history, but that impression would be misleading. In video history as we have experimented with it, individuals are convened in small informal groups to reminisce, explain, correct one another, and compare notes concerning the incident or activity in which they shared a role. Such a simple description of the technique does not convey its power; for this kind of video history often produces new and informative material for the scholar, politician, journalist, teacher, student, and layman with a serious interest in public affairs.

Video technology now permits taping in the ambience of an ordinary living room; lapel microphones are used and room lighting is sufficient; no one is "made up"; there is no set design, no stage director, no cueing or prompting. Four cameras, which would have been extravagantly expensive at an earlier stage in video technology, run continuously. A moderator thoroughly familiar with the subject matter is present but is mostly a facilitator of the conversation rather than a guide or goad. Because candor is encouraged, those who take part in these experiments, which often touch on sensitive subjects, are assured of their right to have any passage deleted or embargoed. To date no one has exercised that right.

The Foundation first tested the concept of video history in a taping session at M.I.T. in 1981 in which a dozen scientists, engineers, and economists took part in groups of four or five. The participants had been members of a team that had conducted Project Charles, a study organized early in 1950 when it was learned that the Soviet Union had detonated a nuclear device the previous summer. Project Charles led to the creation of Lincoln Laboratory and the development of the air defense system of the 1950's. Encouraged by this first experiment, we moved on to a second in 1982, this one dealing with the decision by President Truman in 1950 to accelerate the development of the hydrogen

bomb. We also made a grant that year to M.I.T. to conduct a three-year video history project on the development of the digital computer.

The two tapings done by the Foundation were shown to historians, political scientists, and other scholars, particularly at the Kennedy School of Government at Harvard, where they met with general approval and helpful criticism. We were assured that such material would be valuable not only as a historical and archival record but as a unique resource in the classroom, complementing textbooks and other more customary materials. This response led us to still another experiment in 1983 as well as to the making of several grants for the support of video history projects outside the Foundation. The project we conducted ourselves concerned the Cuban Missile Crisis of 1962 and the deliberations of President Kennedy's special Executive Committee that met daily throughout that unprecedented crisis. Among those taking part in the three tapings done at different times in 1983 were McGeorge Bundy, Dean Rusk, George W. Ball, U. Alexis Johnson, Robert S. McNamara, Maxwell D. Taylor, Edwin M. Martin, and Donald M. Wilson. We were again encouraged by the good opinion that many scholars and the participants themselves had of these tapings and of the technique of video history.

Grants in 1983 for external projects were made to Brandeis University for taping the recollections and experiences of I. I. Rabi, physicist and Nobel Laureate; and to Tufts University for taping a discussion among former senior officers of the Department of State.

In 1984 we continued our experimental work in video history. From an internal appropriation of $100,000 approved by the Trustees last year, both internal and external projects were conducted. The Foundation's staff organized a taping with former Ambassadors to the Soviet Union, including Jacob F. Beam, George F. Kennan, Foy Kohler, Malcolm Toon, and Thomas J. Watson, whose individual and collective reminiscences about their service in that most demanding of ambassadorial assignments produced a great deal of interesting material. We did still another taping last year, on the Test Ban Treaty of 1963, that was equally interesting and that had as participants David Harlech, Carl Kaysen, Spurgeon Keeny, Franklin A. Long, Frank Press, Jerome B. Wiesner, and Abram Chayes as moderator.

From the same internal appropriation, several grants were made for video history projects conducted outside the Foundation:

Brandeis University **$1,250**
Waltham, Massachusetts 02254 (over one year)

For purchase of video tape cassettes of the 1984 debates in the House of Representatives on the Simpson-Mazzoli Immigration Reform Bill, to be used for teaching and research purposes. (Project director: Lawrence H. Fuchs, Chairman of the American Studies Department.)

Gerald R. Ford Foundation — **$15,000**
13999 West Bay Shore Drive — (over one year)
Traverse City, Michigan 49684

For a collaborative project of several presidential libraries to tape former First Ladies. (Project director: Donald Wilson, Director of the Library.)

Massachusetts Institute of Technology — **$15,000**
Cambridge, Massachusetts 02139 — (over one year)

Partial support for completion of the video history of the digital computer. (Project director: Ithiel de Sola Pool, Professor of Political Science.)

Last year the Foundation also conducted a three-day conference on the use of video history materials in high schools and colleges, and more broadly on the use of other kinds of video materials, including interactive (that is, computer-controlled) video materials, in the classroom. The participants were fully conscious that the state of the art in the effective use of video materials is still rudimenary, but they finished the conference with a strong belief in the potential of this technology and many with the intention of doing experimental work themselves.

We believe our work over the last four years in video history, together with the work of our grantees, has clearly demonstrated the value of this technique for both historical and instructional purposes. The time has come, it seems to us, for the establishment of an institutional home for video history where a long-term program can be conducted; the Foundation intends to explore that possibility in 1985.

Other Trustee Grants for Miscellaneous Purposes

Vanderbilt University — **$325,000**
Nashville, Tennessee 37212 — (over one year)

This grant represents continuing support of the project on the Presidential Selection Process being done under the direction of Alexander Heard, Chancellor Emeritus of Vanderbilt. The Foundation's annual report for 1980, free on request, discussed this five-year project in detail.

Harvard University — **$250,000**
Cambridge, Massachusetts 02138 — (over three years)

The Foundation made a grant of $750,000 to Harvard in 1980 to finance the first phase of a long-term research project at the university's School of Public Health.

The purpose of the project, in the words of those conducting it, is: "to formulate environmental health practices in a way that is simultaneously sensitive to economic and health objectives, that seeks, explicitly, to allocate resources in a coherent, rational manner. We believe that better, more rigorous, policy analysis of issues ranging from the use of resources in the development of a scientific data base for environmental decision making, to the regulation of specific substances, to the mechanisms for implementing environmental controls, can promote such a rational basis for policy." Research on related problems such as risk assessment, regulatory decision making, and institutional design, is also going forward. This grant is renewal and final support for the project. (Project director: John C. Bailar, Principal Investigator, Studies on Environmental Health Policy.)

Harvard University — **$250,000**
Cambridge, Massachusetts 02138 — (over two years)

The Foundation made two grants in 1982 totaling $500,000 to help the Harvard Law School begin a comprehensive examination of the law school curriculum and the role of lawyers in American life. Law schools have traditionally concentrated on teaching and developing the doctrine of the law and the set of rules and understandings that regulate relationships among individuals and organizations and between these and government. Law schools have also paid regular attention to the proper role of institutions (courts, legislatures, administrative agencies) and to the processes through which disputes are formally resolved. The role of lawyers in the United States, the needs that are met and unmet for legal services, the effect of "legalization" of relationships, and the failures of courts and related institutions, have not been handled by law schools with either sustained attention or a general integrating plan. It is to these complex and intertwining problems that the Law School's Program on the Legal Profession has been directing itself for the last two years. This grant is renewal and final support for the project. (Project director: James Vorenberg, Dean, Harvard Law School.)

Foundation Center — **$150,000**
888 Seventh Avenue — (over one year)
New York, New York 10106

The Foundation Center is the nation's principal source of information on organized philanthropy, providing a family of services to grantseekers, grantmakers, government agencies, and the public. Sloan has made yearly contributions to its budget since 1963. This grant helped the Center meet the extraordinary expense of moving to new quarters last year, but is to be considered the Sloan Foundation's contribution to the Center for a three-year period. (Project director: Thomas R. Buckman, President.)

Aspen Institute for Humanistic Studies — **$120,000**
1523 New Hampshire Avenue, N. W. — (over one year)
Washington, D. C. 20036

Early last year we made an officer grant, reported below, to the Aspen Institute to help that organization launch a project called "U. S.-Soviet Relations: Planning for 1985 and Beyond." The project is under the direction of former U. S. Senator Dick Clark of Iowa, now Senior Fellow at the Aspen Institute, who was a scholar and teacher of Russian history and government before he became a public official. The purpose of the project is to develop a blueprint for an improved relationship between the two superpowers based on their common interests. Many of the nation's leading authorities on U. S.-Soviet relations will take part in the work. Our planning grant was followed by this grant last year to help support the main project.

New York University — **$120,000**
New York, New York 10012 — (over two years)

The Foundation made a grant of $300,000 in 1979 to New York University to help McGeorge Bundy, Professor of History, prepare a multi-volume work called *The Nuclear Decades*. Professor Bundy's purpose is to analyze scientific, military, and political data concerning nuclear policies; the differing conceptions of policy makers concerning the use of nuclear technology; and the ways in which nuclear technology has altered the foreign policy of the nuclear powers. There is as yet no satisfactory, not to say definitive, history of the nuclear age; Professor Bundy's work promises to fill that gap. This grant is renewal and final support.

Boys Harbor, Inc. — **$100,000**
1 East 104th Street — (over two years)
New York, New York 10029

The Foundation makes a number of "civic" grants each year to educational institutions or social service agencies in New York City. We normally make one or two major grants and two or three officer grants in this manner as corporate citizens of the city. Boys Harbor is a privately funded social agency in New York City that provides a wide range of educational, recreational, and counseling programs for boys and girls from Harlem. Since 1977 Boys Harbor has conducted a number of science education programs for individuals from ages 8-18. One of its programs has been done in close cooperation with the City College of New York, where students take courses in physics, chemistry, biology, and computer science, and are also given remedial tutoring in reading, mathematics, and other basic skills. Boys Harbor is now in the process of consolidating its various science programs and of housing them in a new science laboratory at its main site. We made this contribution to the new science project as a civic grant last year. (Project director: Richard L. Williams, Director of Boys Harbor.)

New York University — **$100,000**
New York, New York 10006 — (over one year)

The "prudent man rule" and its effects on modern portfolio management is a source of dispute between financial managers and legal counsel at many non-profit organizations, including foundations and universities. The rapid development of new financial instruments and new investment techniques along with other results of the deregulation of financial institutions have outpaced the development of the law, particularly with respect to the prudent man rule. This grant will meet part of the costs of a study of these issues by Bevis Longstreth, a partner in the law firm of Debevoise and Plimpton and a former Commissioner of the Securities and Exchange Commission. He will do his study in cooperation with the Salomon Brothers Center for the Study of Financial Institutions at New York University. (Project director: Arnold W. Sametz, Professor of Economics and Finance at N.Y.U.)

Research Foundation of the City University of New York — **$100,000**
1515 Broadway — (over two years)
New York, New York 10036

The Academy of Finance is part of the public school system of New York City, providing a two-year program in finance for high school juniors and seniors from a number of schools in the city system. An extensive curriculum dealing with the financial services industry has been developed at the Academy with financial aid from Shearson/Lehman Brothers/American Express. Students take courses in accounting, banking, insurance, economics, data processing, and financial planning. Five high schools and over 400 students are now taking part in the program. Last year a group of 35 students from one of the schools enrolled in a standard three-credit finance course at the Baruch College campus of City University; Baruch is the largest fully accredited public college of business in the United States. This civic grant will help Baruch extend the finance course to all of the Academy's students. (Project director: Francis J. Connelly, Dean of Baruch College.)

Bank Street College of Education — **$83,775**
New York, New York 10025 — (over one year)

In 1984 we made separate civic grants to the Bank Street College of Education and to the New School for Social Research for a joint project in which they will work together to develop a new doctoral program. The program will be designed to attract promising students who wish to make a career as specialists in educational technology, particularly computer technology. Students will receive extensive training in computer techniques, cognitive science, and educational research with emphasis on the design and evaluation of educational software. Bank Street brings to the partnership its experience in educational computing and pedagogy; the New School brings an excellent psychology department and the administrative apparatus for

awarding the Ph.D. degree. The New School is located at 65 Fifth Avenue, New York, New York 10003; its grant, also over one year, was for $41,225. (Project director at Bank Street: Karen Sheingold, Director of the Center for Children and Technology; project director at the New School: Robert Gates, Associate Dean of the Graduate School.)

University of Chicago **$79,000**
Chicago, Illinois 60637 (over one year)

William Kruskal, Dean of the Division of Social Sciences at the University of Chicago, is a distinguished statistician with a special interest in the problem of relative importance in the statistical analysis of causation. The problem arises when an outcome — the performance of a student, for example — is determined by several variables such as class size, teacher quality, home environment, and the intelligence of the students. If each variable is shown to have statistical significance, the determination of their relative importance is a difficult and controversial procedure. This grant will enable Dean Kruskal to devote time to a study of the problem of relative importance.

American Assembly **$50,000**
Columbia University (over one year)
New York, New York 10027

The American Assembly was founded in 1950 by Dwight D. Eisenhower as an instrument for bringing people of divergent views about important problems together in search of consensus. This mode of operation has served the Assembly well for many years. In 1984 it launched a project on reforming and simplifying the federal tax system; the project will be conducted in the Assembly's usual manner by Joseph A. Pechman, Senior Fellow of the Brookings Institution. This grant will meet part of the cost of the project.

Officer Grants for Miscellaneous Purposes

American Council on Education **$18,000**
One DuPont Circle, N. W. (over one year)
Washington, D. C. 20036

For a series of workshops to develop post-tenure review and evaluation systems in higher education. (Project director: John B. Bennett, Director of the Office on Self-Regulation.)

American Statistical Association **$10,000**
806 Fifteenth Street, N. W. (over one year)
Washington, D. C. 20005

Partial support for a symposium entitled "Statistics and the Environment." (Project director: Fred C. Leone, Executive Director.)

Aspen Institute for Humanistic Studies **$20,000**
1523 New Hampshire Avenue, N. W. (over one year)
Washington, D. C. 20036

For the planning phase of a study called, "U. S.-Soviet Relations—Planning for 1985 and Beyond." (Project director: Dick Clark, Senior Fellow.)

Association of American Universities **$20,000**
One DuPont Circle, N. W. (over two years)
Washington, D. C. 20036

Partial support for moving the Graduate Research Project of the Consortium for the Financing of Higher Education from Stanford University to Northwestern University. (Project director: Robert M. Rosenzweig, President of AAU.)

Brandeis University **$20,000**
Waltham, Massachusetts 02254 (over one year)

Partial support for a study of the intersection between ethnic and immigration policies. (Project director: Lawrence H. Fuchs, Chairman of the American Studies Department.)

Council on Foundations, Inc. **$20,000**
1828 L Street, N. W. (over one year)
Washington, D. C. 20036

For the Sloan Foundation's membership dues for 1984 in the principal national association of private foundations. (Project director: James A. Joseph, President.)

Educational Foundation for Nuclear Science **$10,000**
5801 South Kenwood Avenue (over one year)
Chicago, Illinois 60637

Partial support for a conference to consider the future role of *The Bulletin of the Atomic Scientists*. (Project director: Thomas Hazinski, General Manager of the Educational Foundation for Nuclear Science.)

Floating Hospital — **$10,000**
275 Madison Avenue — (over one year)
New York, New York 10016

A civic grant in support of the Summer Health Internship Program. (Project director: Elayne Weinbaum, Executive Director.)

Fund for the City of New York — **$20,000**
419 Park Avenue South — (over one year)
New York, New York 10016

A civic grant in support of a program to broaden the professional background of government employees and managers of community organizations. (Project director: Gregory Farrell, Executive Director.)

Massachusetts Institute of Technology — **$10,000**
Cambridge, Massachusetts 02139 — (over one year)

Partial support for a conference on ownership and licensing issues, and other problems associated with software development in institutions of higher education. (Project director: Eric Johnson, Assistant Dean of Engineering.)

National Academy of Sciences — **$30,000**
2101 Constitution Avenue — (over one year)
Washington, D. C. 20418

Partial support for a workshop on changing age and family structures. (Project director: Robert J. Lapham, Study Director of the Committee on Population.)

New School for Social Research — **$20,000**
New York, New York 10003 — (over one year)

Partial support for a study to formulate theoretical issues with respect to the narrative form of expression. (Project director: Jerome Bruner, George H. Mead University Professor.)

New York City Board of Education — **$12,000**
131 Livingston Street — (over one year)
Brooklyn, New York 11201

A civic grant in support of high school teachers of science and mathematics to attend the 1984 conference of the American Association for the Advancement of Science. (Project director: Charlotte Frank, Executive Director of the Division of Curriculum and Instruction.)

Palace of Arts and Science Foundation — **$20,000**
3601 Lyon Street — (over one year)
San Francisco, California 94123

Partial support for a project to videotape the exhibits of the Exploratorium for internal use and use at other museums. (Project director: Frank Oppenheimer, Director.)

Rand Corporation — **$2,500**
1700 Main Street — (over one year)
Santa Monica, California 90406

For a primer on the calculation of indirect costs in non-profit institutions. (Project director: David M. Lyon, Vice President.)

Research Foundation of the City University of New York — **$20,000**
1515 Broadway — (over one year)
New York, New York 10036

Partial support for the preparation of a history of the City University of New York. (Project director: Julius C. C. Edelstein, Senior Vice Chancellor Emeritus.)

Statue of Liberty-Ellis Island Foundation, Inc. — **$30,000**
101 Park Avenue — (over two years)
New York, New York 10178

A civic grant to finance meetings of the History Committee of the Statue of Liberty-Ellis Island Commission. (Project director: Rudolph J. Vecoli, Co-Chairman of the History Committee.)

Taylor University — **$4,000**
Upland, Indiana 46989 — (over one year)

For a symposium on the problems of academic computing at small liberal arts colleges, to be conducted at the annual meeting of the National Educational Computing Conference. (Project director: W. Waldo Roth, Chairman of the Information Sciences Department.)

United Way of Tri-State — **$3,500**
99 Park Avenue — (over one year)
New York, New York 10016

A civic grant made as a contribution to this organization's annual fund-raising drive. (Project director: Calvin Green, President.)

University of Hartford **$20,000**
Hartford, Connecticut 06117 (over two years)

Partial support for the development of "Project Infrastructure," a study of public structures in Connecticut and the state policies required for their repair and maintenance. (Project director: Stephen Joel Trachtenberg, President.)

University of Pennsylvania **$20,000**
Philadelphia, Pennsylvania 19104 (over three years)

Partial support during 1984-1987 for the President's Forum, "Improving the American Political System," a yearly convocation on social issues. (Project director: Sheldon Hackney, President.)

University of Pennsylvania **$20,000**
Philadelphia, Pennsylvania 19104 (over one year)

A civic grant made in partial support of a joint project between the Wharton School and the New York City Department of Juvenile Justice to develop a new organizational structure for that department. (Project directors: Thomas Gilmore, Associate Director of the Management and Behavioral Science Center at the Wharton School; and Ellen Schall, Commissioner, New York City Department of Juvenile Justice.)

University of Pennsylvania **$8,000**
Philadelphia, Pennsylvania 19104 (over one year)

Partial support for certain expenses of Dr. Dian-Ming Zhang, a Chinese neuroscientist, to allow him to continue his work in collaboration with American colleagues upon his return to the People's Republic of China. (Project director: Eliot Stellar, Professor of Physiology.)

Yale University **$18,500**
New Haven, Connecticut 06520 (over one year)

For an exploratory study of the educational uses of microcomputers, by Douglas Frye, Post-Doctoral Fellow.

Yale University **$18,142**
New Haven, Connecticut 06520 (over two years)

Partial support for the preparation of a history of American psychology, by William Kessen, Professor of Psychology.

Financial Review

Financial Review

The financial statements and schedules of the Foundation, which have been audited by Ernst & Whinney, independent auditors, appear on pages 66 to 81. They include the balance sheets, the statements of income, expenses and changes in fund balance, changes in financial position, the schedules of management and investment expenses, investments, and grants and appropriations.

Investment and other income for 1984 was $27,042,921, an increase of $5,382,076 from $21,660,845 in 1983. After the deduction of investment expenses and provision for Federal excise tax from investment and other income, net investment income was $25,346,762 in 1984 as compared with $20,038,833 for the prior year. Investment expenses during 1984 totaled $936,159, of which $594,545 represented investment counsel fees. Provision for Federal excise tax amounted to $760,000. The total of these deductions from income in 1984 was $1,696,159 versus $1,622,012 in 1983.

The total of grants and appropriations authorized net of grant refunds and management expenses during 1984 was $19,740,022. This sum was $5,606,740 under 1984 net investment income. Of this total, grants and appropriations authorized amounted to $18,196,208 while management expenses were $1,742,689. Since the Foundation's inception in 1934, the cumulative excess of grants and expenses over the Foundation's income has amounted to $40,872,531.

Grant and appropriation payments in 1984 were $17,083,690, compared with $16,626,893 the prior year. Together with management expenses, investment expenses and Federal excise taxes paid, the total of cash expenditures net of grant refunds in 1984 was $20,451,687, while in 1983 the amount was $19,160,297.

The market value of the Foundation's total assets were $371,148,237 at December 31, 1984, including investments valued at $370,358,288, as compared with total assets of $360,842,476 at December 31, 1983. A summary of the Foundation's investments at cost and market value at December 31, 1984 appears on page 71.

A listing of grants made during 1984 including grants and appropriations authorized and payments during the year will be found on pages 77 to 81.

Report of Ernst & Whinney Independent Auditors

Board of Trustees
Alfred P. Sloan Foundation
New York, New York

We have examined the balance sheets of the Alfred P. Sloan Foundation as of December 31, 1984 and 1983 and the related statements of income, expenses and changes in fund balance and changes in financial position for the years then ended and the supplementary schedules of investments at December 31, 1984, grants and appropriations for the year then ended and management and investment expenses for the years ended December 31, 1984 and 1983. 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, the financial statements referred to above present fairly the financial position of the Alfred P. Sloan Foundation at December 31, 1984 and 1983, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis. Also, in our opinion, the supplementary schedules referred to above are fairly stated in all material respects in relation to the financial statements taken as a whole.

Ernst & Whinney

New York, New York
January 25, 1985

Balance Sheets

December 31, 1984 and 1983

	1984	1983
Assets		
Investments:		
Fixed income:		
U.S. Government and agency	$ 54,049,351	$ 42,774,487
Corporate and other	84,197,775	60,128,060
	138,247,126	102,902,547
Equity:		
General Motors Corporation	40,462,644	40,665,143
Other	125,630,453	141,746,252
	166,093,097	182,411,395
Total investments (market value: $370,358,288 in 1984 and $360,764,296 in 1983)	304,340,223	285,313,942
Amount due for securities sold, not delivered	650,513	
Cash	139,436	78,180
Total	$305,130,172	$285,392,122
Liabilities and Fund Balance		
Grants and appropriations unpaid	$ 16,803,089	$ 15,690,571
Federal excise tax and other liabilities	912,555	1,050,895
Fund balance	287,414,528	268,650,656
Total	$305,130,172	$285,392,122

See accompanying notes to financial statements.

Statements of Income, Expenses and Changes In Fund Balance

For the years ended December 31, 1984 and 1983

	1984	1983
Investment Income:		
Dividends	$ 11,558,859	$ 10,746,530
Interest	15,392,147	10,903,183
Other	91,915	11,132
	27,042,921	21,660,845
Less:		
Investment expenses	936,159	734,012
Provision for Federal excise tax	760,000	888,000
	1,696,159	1,622,012
Net investment income	25,346,762	20,038,833
Grants and management expenses:		
Grants and appropriations authorized (net of grant refunds of $198,875 in 1984 and $79,090 in 1983)	17,997,333	15,359,625
Management expenses	1,742,689	1,445,142
Total	19,740,022	16,804,767
Grants and expenses less than income for the year	5,606,740	3,234,066
Net gain on disposals of securities	12,982,129	28,568,621
Assets received as remainderman of various trusts	175,003	2,164,852
NET CHANGE IN FUND BALANCE FOR YEAR	18,763,872	33,967,539
Fund balance January 1	268,650,656	234,683,117
FUND BALANCE AT END OF YEAR	$287,414,528	$268,650,656

See accompanying notes to financial statements.

Statements of Changes in Financial Position

For the years ended December 31, 1984 and 1983

	1984	1983
SOURCES OF FUNDS		
Investment income	$27,042,921	$21,660,845
Net gain on disposals of securities	12,982,129	28,568,621
Other	164,687	2,214,058
	40,189,737	52,443,524
APPLICATION OF FUNDS		
Grant and appropriation payments (net of grant refunds of $198,875 in 1984 and $79,090 in 1983)	16,884,815	16,547,803
Management expenses	1,742,689	1,445,142
Investment expenses	936,159	734,012
Federal excise taxes paid	888,024	433,340
	20,451,687	19,160,297
INCREASE (DECREASE) IN FUNDS CONSISTING OF		
Cost of investments	19,026,281	33,447,230
Amount due for securities sold, not delivered	650,513	
Cash balances	61,256	(164,003)
NET INCREASE	$19,738,050	$33,283,227

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 management expenses are recorded on the cash basis, the effect of which on the accompanying financial statements is not materially different from the accrual basis.

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

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 $140,585 and $129,879 for 1984 and 1983, respectively.

3. LEASE

The Foundation's lease for its office space was renewed and expires April 30, 1993. The lease contains an escalation clause which provides for rental increases resulting from increases in real estate taxes and certain other operating expenses. Under the lease, rent was $479,122 in 1984 and $290,518 in 1983, before sublease income.

4. FUND BALANCE

Fund balance, at year end, is comprised of the following:

	1984	1983
Principal	$328,287,059	$315,129,927
Income—cumulative excess of grants and expenses over income from inception of the Foundation	(40,872,531)	(46,479,271)
Fund balance	$287,414,528	$268,650,656

Schedules of Management and Investment Expenses

For the years ended December 31, 1984 and 1983

	1984	1983
MANAGEMENT EXPENSES		
Salaries and employee benefits:		
Salaries	$ 853,972	$ 799,997
Employees' retirement plan and other benefits	292,858	264,981
Total	1,146,830	1,064,978
Rent (net of sublease rentals of approximately $45,000 and $44,000, respectively)	417,730	237,553
Program expenses	302,909	248,910
Office expenses and services	135,544	136,021
Reports and publications	44,652	21,954
Professional fees	36,638	32,856
Total management expenses	2,084,303	1,742,272
Less management expenses applicable to investments	341,614	297,130
Management expenses applicable to grant making	$1,742,689	$1,445,142
INVESTMENT EXPENSES		
Investment counsel fees	$ 594,545	$ 436,882
Management expenses applicable to investments	341,614	297,130
Total investment expenses	$ 936,159	$ 734,012

Schedule of Investments

December 31, 1984

SUMMARY	Cost	Market Amount	Market Percent of Total Investment
Fixed income:			
U.S. Government and agency	$ 54,049,351	$ 54,464,970	14.7%
Corporate and other	84,197,775	85,881,933	23.2
Total fixed income	138,247,126	140,346,903	37.9
Equity:			
General Motors Corporation	40,462,644	75,664,125	20.4
Other	125,630,453	154,347,260	41.7
Total equity	166,093,097	230,011,385	62.1
Total investments	$304,340,223	$370,358,288	100.0%

FIXED INCOME	Principal	Cost	Market
U.S. Treasury:			
Bills 3/28/85	$ 5,000,000	$ 4,744,372	$ 4,910,100
11⅝% Notes 10/31/86	15,000,000	15,105,469	15,360,900
14% Notes 7/15/88	3,000,000	3,195,998	3,269,070
12¼% Notes 11/15/89	20,000,000	21,216,168	21,131,200
10¾% Notes 7/15/90	10,000,000	9,787,344	9,793,700
Total U.S. Treasury		54,049,351	54,464,970
Corporate and other:			
Short term:			
Interest bearing call account	1,082,296	1,082,296	1,082,296
Interest bearing demand notes	1,361,000	1,361,000	1,361,000
Commercial Paper:			
Citicorp 8.31% 1/2/85	13,023,000	13,023,000	13,023,000
Prudential Funding Corporation 8.36% 1/2/85	346,000	346,000	346,000
Repurchase Agreements:			
9% 1/2/85	9,000,000	9,000,000	9,000,000
9½% 1/2/85	10,000,000	10,000,000	10,000,000
Total short term		34,812,296	34,812,296
Long term:			
Air Products and Chemicals, Inc. 14⅜% Notes 8/1/87	1,000,000	995,000	1,084,270
12¾% Notes 4/15/94	3,000,000	2,917,740	3,141,060
American Telephone and Telegraph Company 13¼% Notes 3/15/91	2,000,000	1,904,600	2,097,500

Schedule of Investments

December 31, 1984
(continued)

FIXED INCOME	Principal	Cost	Market
Corporate and other (continued):			
Long term (continued):			
Chesapeake & Ohio Railway Company			
8½% Conditional Sale Agreement 1/1/89	$ 478,634	$ 385,786	$ 455,898
Citicorp			
13⅛% Notes 5/1/89	5,000,000	5,000,000	5,152,150
E.I. duPont de Nemours and Company			
14% Notes 12/1/91	3,000,000	2,915,000	3,250,410
Federal Republic of Germany			
7¼% Bonds 11/1/90	2,200,000(DM)	842,131	726,702
First National Bank, Chicago			
11.70% Certificate of Deposit 10/24/86	5,000,000	5,044,119	5,095,050
General Motors Acceptance Corporation			
12¼% Notes 10/1/87	2,000,000	2,043,040	2,025,240
14⅛% Notes 6/15/89	2,000,000	1,956,180	2,154,520
Government of Netherlands			
8½% Bonds 3/15/91	2,500,000 (Florins)	852,593	752,635
Household Finance Corporation			
10¼% Notes 12/1/87	3,500,000	3,491,250	3,487,190
International Bank for Reconstruction and Development			
14⅜% Notes 8/1/87	3,000,000	3,321,570	3,252,810
Manufacturers Hanover Corporation			
9⅝% Notes 5/1/86	3,000,000	2,923,620	2,962,680
Mellon Bank, N.A.			
11.60% Certificate of Deposit 1/13/89	1,600,000	1,592,000	1,593,792
NCNB Corporation			
14½% Notes 9/1/92	3,000,000	3,007,500	3,275,100
SCOA Industries, Inc.			
10% Convertible Subordinated Debentures 9/1/2007	1,000,000	1,223,020	1,160,000
Standard Oil Company (Indiana)			
14% Notes 6/1/91	3,000,000	2,989,080	3,235,590
Standard Oil Company (Ohio)			
13⅛% Notes 9/15/92	3,000,000	2,981,250	3,186,720
Xerox Corporation			
10½% Notes 3/1/88	3,000,000	3,000,000	2,980,320
Total long term		49,385,479	51,069,637
Total corporate and other		84,197,775	85,881,933
Total fixed income securities		$138,247,126	$140,346,903

Schedule of Investments

December 31, 1984
(continued)

EQUITY	Number of Shares	Cost	Market
United States:			
American Information Technologies Corporation	22,200	$ 1,386,066	$ 1,703,850
Associated Dry Goods Corporation	40,000	1,046,352	2,050,000
Atlantic Richfield Company	51,000	1,882,628	2,250,375
BankAmerica Corporation	96,200	2,082,757	1,743,625
Bell Atlantic Corporation	19,000	1,271,327	1,527,126
BellSouth Corporation	33,300	868,024	1,132,200
Burlington Industries, Inc.	53,800	1,435,238	1,365,175
CPC International, Inc.	62,400	2,573,067	2,496,000
Champion International Corporation	122,800	3,308,760	2,732,300
Chase Manhattan Corporation	57,300	2,502,369	2,736,075
Chemical New York Corporation	66,600	1,884,134	2,297,700
Chesebrough-Pond's, Inc.	55,300	2,054,857	1,859,463
Citicorp	56,300	1,767,370	2,181,625
Colgate-Palmolive Company	53,000	909,350	1,318,375
Deltona Corporation	70,000	1,060,395	341,250
Diamond Shamrock Corporation	127,400	2,921,473	2,261,350
Dresser Industries, Inc.	35,000	641,795	638,750
Eastman Kodak Company	52,500	2,993,792	3,773,438
First Chicago Corporation	64,000	1,412,150	1,368,000
First Savings Association of Wisconsin	20,000	245,052	165,000
GTE Corporation	73,000	1,968,825	2,965,625
General Electric Company	55,200	1,506,879	3,125,700
General Motors Corporation	940,000	39,432,667	73,672,500
General Motors Corporation, Class E	47,000	1,029,977	1,991,625
Genstar Corporation	113,600	1,842,615	2,300,400
Gulfstream Land and Development Corporation	70,000	1,310,218	1,723,750
Hospital Corporation of America	22,200	854,003	838,050
International Business Machines Corporation	162,000	5,915,027	19,946,250
LTV Corporation	114,000	2,410,976	1,125,750
Lilly (Eli) & Company	30,600	1,890,939	2,019,600
Manufacturers Hanover Corporation	33,000	1,075,871	1,208,625
McGraw-Edison Company	30,700	1,373,395	1,170,438
Minnesota Mining and Manufacturing Company	26,800	2,206,694	2,107,150
Morgan (J.P.) & Company Inc.	70,000	1,310,880	5,495,000
Motorola, Inc.	86,100	2,928,054	2,905,875
NL Industries, Inc.	82,000	1,980,712	902,000
NYNEX Corporation	38,100	2,516,290	2,828,925
NWA, Inc.	46,200	1,555,839	1,882,650
Pacific Gas & Electric Company	190,000	2,065,483	3,111,250
Pacific Telesis Group	23,000	1,322,225	1,584,126

Schedule of Investments

December 31, 1984
(continued)

EQUITY	Number of Shares	Cost	Market
United States: (continued)			
Penney (J.C.) Company	56,400	$ 2,259,071	$ 2,615,550
Perkin-Elmer Corporation	82,700	2,348,339	2,160,538
Polaroid Corporation	21,800	648,722	604,950
Punta Gorda Isles, Inc.	30,000	403,755	157,500
Quaker State Oil Refining Corporation	58,700	1,141,541	1,063,938
Research-Cottrell, Inc.	96,300	1,792,333	1,564,875
Reynolds Metals Company	33,500	1,148,312	1,122,250
Ryans Family Steakhouse, Inc.	48,800	1,210,075	902,800
Safeway Stores, Inc.	59,000	1,410,952	1,600,375
Santa Fe Southern Pacific Corporation	109,954	2,716,420	2,831,316
Schlumberger, Ltd.	55,675	743,457	2,122,609
Sears, Roebuck & Company	77,610	1,338,040	2,464,118
S I Handling Systems, Inc.	28,000	462,825	133,000
Southwestern Bell Corporation	22,200	1,237,262	1,570,650
Sperry Corporation	79,400	3,012,672	3,305,025
Square D Company	33,600	682,752	1,323,000
Sterling Drug Inc.	51,000	1,049,811	1,472,625
Syntex Corporation	23,000	589,255	1,118,375
Tenneco, Inc.	42,000	1,650,545	1,590,750
Texas Utilities Company	98,800	2,314,754	2,605,850
Textron, Inc.	39,000	1,017,427	1,321,125
Transamerica Corporation	106,600	2,442,797	2,784,925
Travelers Corporation	75,000	1,539,500	2,793,750
U S West, Inc.	22,200	1,215,935	1,565,100
Union Carbide Corporation	43,300	2,200,474	1,591,275
Union Electric Company	152,700	2,054,148	2,519,550
United Technologies Corporation	61,100	2,281,895	2,214,875
Weyerhaeuser Company	65,300	1,925,180	1,901,863
White Consolidated Industries, Inc.	84,300	2,874,464	2,444,700
Australia and Hong Kong:			
BSR International, PLC	30,000	25,885	49,013
China Light and Power Company	200,000	299,458	309,473
Dunlop Olympic, Ltd.	132,000	185,772	202,677
Hong Kong Land Company	680,000	289,358	330,445
Swire Pacific, Ltd.	120,000	298,149	326,865
Federal Republic of Germany:			
Deutsche Bank A.G. (warrants)	4,500	135,610	197,049
Mercedes-Automobile Holding A.G.	1,278	145,646	204,464
Siemens A.G.	3,050	399,005	458,637
Japan:			
Canon, Inc.	36,800	197,310	196,033

Schedule of Investments

December 31, 1984
(continued)

EQUITY	Number of Shares	Cost	Market
Japan: (continued)			
Canon Sales Company, Ltd.	11,500	$ 153,435	$ 134,864
Casio Computer Company, Ltd.	30,000	188,254	209,899
Chugai Pharmaceutical Company, Ltd.	27,600	104,803	125,080
Eisai Company, Ltd.	26,000	145,410	137,468
Fanuc Company, Ltd.	6,500	279,754	291,990
Fujisawa Pharmaceutical Company, Ltd.	1,000	4,212	4,413
Fujitsu, Ltd.	78,000	421,447	418,605
Hitachi, Ltd.	55,000	205,179	188,034
Honda Motor Company, Ltd.	30,000	164,782	144,305
Hoya Corporation	20,000	179,638	171,735
Ikegami Tsushinki Company	46,000	492,521	373,047
Kashiyama & Company, Ltd.	90,000	234,706	222,898
Kyocera Corporation	5,000	120,345	138,740
NGK Insulator, Ltd.	50,000	164,925	194,792
Nippon Kogaku K.K.	23,000	103,227	123,435
Nippon Yakin Kogyo Company, Ltd.	180,000	276,508	216,816
Nitsuko, Ltd.	1,000	2,494	7,553
Nitto Electric Industrial Company, Ltd.	30,000	266,458	230,173
Okamoto Machine Tool Works, Ltd.	60,000	237,743	177,698
Orient Finance Company, Ltd.	5,000	20,369	18,883
Ricoh Company, Ltd.	32,000	144,969	118,434
Sankyo Company, Ltd.	3,000	7,492	12,165
Sharp Corporation	40,000	191,743	174,916
Taiyo Yuden Company, Ltd.	4,000	20,486	16,855
Takeda Chemical Industries, Ltd.	3,000	10,962	9,600
Takeda Riken	6,000	187,346	150,268
Tokio Marine and Fire Insurance Company, Ltd.	50,000	151,680	145,895
Yamato Transport Company, Ltd.	1,000	2,630	4,730
Netherlands, Norway and Switzerland:			
Norsk Data (ADR)	4,000	151,261	151,500
Norsk Hydro A.S. (ADR)	12,500	224,050	135,000
Royal Dutch Petroleum Company	1,000	47,612	48,208
Royal Dutch Petroleum Company (USA)	5,000	219,570	246,875
Sandoz A.G.	300	132,954	131,412
Schweiz-Ruckversicherungs (part. ctf.)	260	176,292	152,853
Schweizerische Bankgesellshaft (warrants)	500	173,991	228,626
Swissair-Schweiz Luftverkehr A.G.	300	122,181	122,767
Unilever N.V.	1,500	130,999	127,969

Schedule of Investments

December 31, 1984
(continued)

EQUITY	Number of Shares	Cost	Market
United Kingdom and Canada:			
BTR, Ltd.	40,000	$ 244,479	$ 284,577
British Petroleum Company, PLC	25,000	128,716	140,782
British Telecommunications, PLC	30,000	17,876	36,673
Glaxo Holdings, PLC	18,000	249,330	229,423
Hanson Trust, PLC	60,000	178,993	238,460
Imperial Chemical Industries, PLC	20,000	157,448	170,560
Jaguar, PLC	55,000	126,088	162,508
Lloyds Bank, PLC	20,000	121,070	124,444
Metal Box, PLC	24,000	120,434	111,235
Midland Bank, PLC	30,000	120,273	130,006
Northern Telecom Ltd.	5,000	201,069	170,625
Thorn EMI, PLC	6,000	51,313	33,649
Woolworth Holdings, PLC	12,000	80,149	81,063
Total equity		166,093,097	230,011,385
Total fixed income		138,247,126	140,346,903
Total investments		$304,340,223	$370,358,288

1984
Schedule of Grants and Appropriations

	Unpaid Dec. 31, 1983	1984 Authorized	1984 Payments	Unpaid Dec. 31, 1984
A & T University Foundation, Inc.	$ 5,000	$ 150,000	$ 55,000	$ 100,000
Alabama, University of	12,500	—	12,500	—
Albany State College	5,000	15,000	20,000	—
American Academy of Arts and Sciences	150,000	29,500	179,500	—
American Assembly	—	50,000	50,000	—
American Council on Education	—	18,000	18,000	—
American Economic Association	200,000	—	100,000	100,000
American Enterprise Institute for Public Policy Research	—	300,000	100,000	200,000
American Mathematical Association of Two Year Colleges	—	30,000	—	30,000
American Statistical Association	—	10,000	10,000	—
Arizona, University of	12,500	4,500	17,000	—
Arizona State University	—	25,000	12,500	12,500
Aspen Institute for Humanistic Studies	—	140,000	100,000	40,000
Association for Symbolic Logic	—	126,000	126,000	—
Association of American Universities	—	20,000	20,000	—
Bank Street College of Education	—	83,775	30,000	53,775
Benedict College	5,000	—	5,000	—
Bennett College	5,000	15,000	20,000	—
Boston College	12,500	—	12,500	—
Boston University	12,500	10,000	22,500	—
Bowdoin College	—	10,000	10,000	—
Boys Harbor, Inc.	—	100,000	50,000	50,000
Brandeis University	25,000	279,975	54,975	250,000
British Columbia, University of	—	28,500	16,000	12,500
Brookings Institution	267,000	250,000	258,000	259,000
Brown University	25,000	26,893	51,893	—
Bryn Mawr College	—	150,000	—	150,000
Bucknell University	—	150,000	—	150,000
California, University of	2,176,000	737,731	1,718,731	1,195,000
California Institute of Technology	25,000	92,400	79,900	37,500
Carleton College	190,000	—	190,000	—
Carnegie Institution of Washington	—	25,000	12,500	12,500
Carnegie-Mellon University	450,000	952,850	565,850	837,000
Center for Advanced Study in the Behavioral Sciences	190,000	—	190,000	—
Central Institute for the Deaf	—	25,000	12,500	12,500
Chicago, University of	62,500	165,900	190,900	37,500
Claremont McKenna College	—	31,000	—	31,000
Clarkson University	81,000	166,000	202,500	44,500
Cognitive Neuroscience Institute	200,000	—	75,000	125,000
Colby College	—	150,000	—	150,000
Cold Spring Harbor Laboratory	—	183,000	75,000	108,000

1984
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1983	1984 Authorized	1984 Payments	Unpaid Dec. 31, 1984
Colgate University	—	$ 150,000	—	$ 150,000
Colorado, University of	—	50,000	$ 37,500	12,500
Columbia University	$ 37,500	183,696	146,196	75,000
Committee for Economic Development	75,000	—	75,000	—
Connecticut, University of, Foundation	—	25,000	12,500	12,500
Consortium for Mathematics and its Applications	61,000	—	—	61,000
Cornell University	212,500	117,600	167,600	162,500
Council on Foundations, Inc.	—	20,000	20,000	—
Council on Library Resources	240,000	—	80,000	160,000
Dartmouth College	125,000	—	125,000	—
Davidson College	125,000	—	125,000	—
Delaware, University of	102,500	25,000	70,000	57,500
Dillard University	—	15,000	15,000	—
Duke University	—	1,295,000	1,002,000	293,000
Economic Alliance for Michigan	—	75,000	75,000	—
Educational Foundation for Nuclear Science	—	10,000	10,000	—
Floating Hospital	—	10,000	10,000	—
Florida State University	12,500	—	12,500	—
Fort Valley State College	5,000	15,000	20,000	—
Foundation Center	—	150,000	150,000	—
Franklin and Marshall College	—	150,000	—	150,000
Fund for the City of New York	—	20,000	20,000	—
Georgia, University of	12,500	—	12,500	—
Georgia Institute of Technology	12,500	150,000	87,500	75,000
Gerald R. Ford Foundation	—	15,000	15,000	—
Great Lakes Colleges Association	—	33,000	—	33,000
Grinnell College	150,000	—	100,000	50,000
Hartford, University of	—	20,000	20,000	—
Harvard University	507,500	1,368,600	1,051,100	825,000
Harvey Mudd College	—	300,000	150,000	150,000
Illinois, University of	100,000	25,000	112,500	12,500
Indiana University Foundation	12,500	31,308	31,308	12,500
Industrial Relations Counselors, Inc.	100,000	—	—	100,000
Iowa State University of Science and Technology	—	50,000	25,000	25,000
Jackson State University	5,000	—	5,000	—
Johns Hopkins University	62,000	95,000	74,500	82,500
Kentucky, University of, Research Foundation	12,500	—	12,500	—
Lafayette College	150,000	—	80,000	70,000
Louisiana State University	12,500	—	12,500	—

1984
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1983	1984 Authorized	1984 Payments	Unpaid Dec. 31, 1984
Manpower Demonstration Research Corporation	—	$ 30,000	$ 30,000	—
Maryland, University of	—	273,889	151,389	$ 122,500
Maryland, University of, Foundation, Inc.	$ 197,500	—	—	197,500
Massachusetts, University of	48,500	—	48,500	—
Massachusetts Institute of Technology	1,112,500	593,200	1,040,700	665,000
Mathematical Association of America	—	7,000	7,000	—
McGill University	—	50,000	—	50,000
Meharry Medical College	70,000	—	70,000	—
Miami, University of	—	39,655	39,655	—
Michigan, University of	100,000	179,856	242,356	37,500
Michigan State University	12,500	25,000	25,000	12,500
Middlebury College	—	150,000	—	150,000
Minnesota, University of	147,500	135,454	270,454	12,500
Missouri, University of	—	20,000	20,000	—
Morehouse College	5,000	15,000	20,000	—
Morris Brown College	5,000	15,000	20,000	—
Mount Holyoke College	150,000	—	100,000	50,000
National Academy of Sciences	—	484,000	257,000	227,000
National Bureau of Economic Research, Inc.	150,000	480,000	355,000	275,000
National Conference on Social Welfare	—	200,000	125,000	75,000
National Research Council	—	20,000	20,000	—
New Brunswick, University of	—	25,000	12,500	12,500
New Hampshire, University of	—	20,000	20,000	—
New Mexico, University of	12,500	—	12,500	—
New School for Social Research	18,000	61,225	58,000	21,225
New York City Board of Education	—	12,000	12,000	—
New York Regional Association of Grantmakers, Inc.	—	20,000	20,000	—
New York University	329,000	271,656	234,906	365,750
North Carolina, University of	12,500	25,000	25,000	12,500
North Carolina Central University	5,000	15,000	20,000	—
Northeastern University	—	19,000	19,000	—
Northwestern University	97,500	133,988	181,488	50,000
Notre Dame, University of	—	25,000	12,500	12,500
Oakwood College	5,000	15,000	20,000	—
Oberlin College	150,000	16,000	116,000	50,000
Ohio State University Research Foundation	50,000	50,000	75,000	25,000
Paine College	5,000	15,000	20,000	—
Palace of Arts and Science Foundation	—	20,000	20,000	—

1984
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1983	1984 Authorized	1984 Payments	Unpaid Dec. 31, 1984
Pennsylvania, University of	$ 162,500	$ 756,191	$ 421,191	$ 497,500
Pennsylvania State University	—	35,000	22,500	12,500
Pittsburgh, University of	—	50,000	25,000	25,000
Polytechnic Institute of New York	—	25,000	12,500	12,500
Princeton University	262,500	462,500	450,000	275,000
Princeton University Press	—	280,150	—	280,150
Rand Corporation	170,000	136,500	236,500	70,000
Rensselaer Polytechnic Institute	—	34,000	34,000	—
Research Foundation of State University of New York	312,500	346,470	533,970	125,000
Research Foundation of The City University of New York	—	153,450	40,950	112,500
Rochester, University of	288,000	100,000	225,500	162,500
Rockefeller University	—	40,000	27,500	12,500
Rust College	5,000	150,000	55,000	100,000
Rutgers University Foundation	—	113,100	75,600	37,500
Salk Institute for Biological Studies	12,500	30,000	12,500	30,000
Savannah State College	5,000	15,000	20,000	—
SIAM Institute for Mathematics and Society	15,000	—	15,000	—
Sigma Xi	60,000	—	30,000	30,000
Smith College	70,000	—	70,000	—
Social Science Research Council	—	22,350	22,350	—
South Carolina, University of	12,500	25,000	25,000	12,500
South Carolina State College	5,000	15,000	20,000	—
Southern California, University of	12,500	50,000	37,500	25,000
Spelman College	5,000	150,000	55,000	100,000
Stanford University	595,000	379,442	466,442	508,000
Statue of Liberty—Ellis Island Foundation, Inc.	—	30,000	30,000	—
Swarthmore College	40,000	—	40,000	—
Syracuse University	20,000	—	20,000	—
Taylor University	—	4,000	4,000	—
Texas, University of	312,500	160,000	247,500	225,000
Trinity College	—	150,000	—	150,000
Tuskegee Institute	5,000	150,000	55,000	100,000
Union College	185,000	—	115,000	70,000
United Way of Tri-State	—	3,500	3,500	—
Universities Research Association, Inc.	—	30,000	30,000	—
Urban Institute	—	255,000	15,000	240,000
Vanderbilt University	—	345,000	345,000	—
Vassar College	100,000	16,000	50,000	66,000
Virginia, University of	12,500	—	12,500	—
Virginia Polytechnic Institute and State University	—	8,000	8,000	—
Washington, University of	97,500	121,686	134,186	85,000

1984
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1983	1984 Authorized	1984 Payments	Unpaid Dec. 31, 1984
Washington University	$ 25,000	—	$ 25,000	—
Wellesley College	170,000	—	65,000	$ 105,000
Wesleyan University	12,500	—	12,500	—
WGBH Educational Foundation	—	$ 20,000	20,000	—
William and Mary, College of	12,500	—	12,500	—
Williams College	150,000	—	100,000	50,000
Wisconsin, University of	12,500	18,000	30,500	—
Woods Hole Oceanographic Institution	—	20,000	20,000	—
Wyoming, University of	12,500	—	12,500	—
Xavier University of Louisiana	5,000	15,000	20,000	—
Yale University	62,500	651,642	258,142	456,000
Sloan Fellowships for Basic Research to be granted in ensuing year	2,250,000	—	—	2,250,000
Officer grant appropriation for grants in ensuing years	1,000,000	200,000	—	1,200,000
Book program	245,558	—	108,360	137,198
Other appropriations for grants and related expenses	39,513	306,836	97,358	248,991
	15,690,571	18,285,968	17,173,450	16,803,089
Reduction for grant transfers		89,760	89,760	
	$15,690,571	$18,196,208	$17,083,690	$16,803,089

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Alfred P. Sloan Foundation

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

Report for 1985

Alfred P. Sloan, Jr.
1875—1966

The Life of Alfred P. Sloan, Jr., in Brief

Alfred Pritchard Sloan, Jr., was born in New Haven, Connecticut, May 23, 1875, the first of five children of Alfred Pritchard Sloan, Sr., and Katherine Mead Sloan. His father, a machinist by training, was then a partner in a small company importing coffee and tea. The family moved to Brooklyn in 1880, where it was particularly active in the Methodist Church (young Alfred's maternal grandfather was a Methodist minister). Alfred, Jr., excelled as a student both in the public schools and at the Brooklyn Polytechnic Institute where he completed college-preparatory schooling. After some delay in being admitted to the Massachusetts Institute of Technology (which considered him too young when he first applied), he entered M.I.T. in 1892 and took a degree in electrical engineering in three years as the youngest member of his graduating class.

Mr. Sloan began his working career as a draftsman in a small machine shop, the Hyatt Roller Bearing Company of Newark, New Jersey. At his urging, Hyatt was soon producing a new, durable steel bearing for automobiles. In 1898 he married Irene Jackson of Roxbury, Massachusetts and the next year became President, at age 24, of Hyatt, where he supervised all areas of the company's business: manufacturing, financing, engineering, and marketing. Hyatt bearings became a standard in the automobile industry, and the company grew rapidly under his leadership. In 1916 the Hyatt Roller Bearing Company, together with a number of other manufacturers of automobile accessories, merged with the United Motors Corporation, of which Mr. Sloan became President. Two years later that company became part of the General Motors Corporation (itself established in 1908 as the General Motors Company), and Mr. Sloan was named Vice President in Charge of Accessories and a member of the Executive Committee.

He was elected President of General Motors in 1923, succeeding Pierre S. du Pont, who said of him on that occasion: "The greater part of the successful development of the Corporation's operations and the building of a strong manufacturing and sales organization is due to Mr. Sloan. His election to the presidency is a natural and well-

merited recognition of his untiring and able efforts and successful achievement." Mr. Sloan had developed by that time his system of disciplined, professional management that provided for decentralized operations with coordinated centralized policy control, which he applied to General Motors and set the Corporation on its course of industrial leadership. The next 23 years — Mr. Sloan's tenure as Chief Executive Officer of General Motors — were years of enormous expansion for the Corporation and of a steady increase in its share of the automobile market.

In 1937 Mr. Sloan was elected Chairman of the Board of General Motors and continued as Chief Executive Officer until 1946. When he resigned from the chairmanship in 1956, the General Motors Board said of him: "The Board of Directors has acceded to Mr. Sloan's wish to retire as Chairman. He has served the Corporation long and magnificently. His analysis and grasp of the problems of corporate management, his great vision and rare good judgment, laid the solid foundation which has made possible the growth and progress of General Motors over the years." Mr. Sloan was then named Honorary Chairman of the Board and retained that title until his death February 17, 1966. For many years before his death he devoted the largest share of his time and energy to philanthropic activities, both as a private donor to many causes and organizations and through the Alfred P. Sloan Foundation, which he established in 1934.

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Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and incorporated in the state of Delaware. Over the last five years the Foundation's grant expenditures have averaged about $17 million a year, and assets at market value at the end of 1985 were $434 million. The Foundation publishes an annual report, free on request, that gives detailed information about all the programs and activities of the Foundation. It also publishes at irregular intervals other papers and reports related to its programs.

The main interests of the Foundation are in higher education, with an emphasis on science, technology, economics, management, and education for the public service; and on instructional programs and problems of society associated with these fields. The Foundation's activities do not extend to primary or secondary education, religion, the creative or performing arts, or to medical research or health care, or to the humanities. Grants are not made for endowments or for buildings or equipment, and are very rarely made for general support or for activities outside the United States.

General and Particular Programs

In 1969 the Foundation adopted a mode of operation that distinguished between the "general program," under which the established interests of the Foundation were pursued, and a set of "particular programs," which focused on sharply defined topics for more limited periods of time. Four particular programs were developed and carried to completion between 1969 and 1979: one to increase the number of minority students in medicine and management; one to support experimental work in educational technology; one to help establish the new discipline of neuroscience; and one to increase the number of minority students in engineering. Expenditures in these programs ranged from nine to fourteen million dollars over a period of five to seven years.

Three particular programs are now in operation: the Cognitive Science Program is in its third and final phase; the New Liberal Arts Program moved into its third year of full operation in 1985; and the Minorities in Public Management Program was at full maturity in 1985. These three particular programs are reviewed at appropriate places in this report.

How to Apply for a Grant

The Foundation's funds are spent in two ways: on programs and activities developed by the Foundation's staff and for which grants are made, usually on a competitive basis, in support of individuals and institutions; and in response to proposals that come unsolicited to the Foundation and that are also judged

competitively. In considering both types of proposals, the Foundation often seeks the advice of outside reviewers. The Foundation unfortunately is obliged to turn down many more proposals, often proposals of great merit, than its resources allow it to support.

Application can be made at any time for support of activities falling within the guidelines indicated above. Grants of $20,000 or less are made throughout the year by the officers of the Foundation and may be made up to $30,000 for projects with high travel costs; grants over that amount are made by the Trustees, who meet five times a year for that purpose. Letters of application are normally sent to the president of the Foundation and include, in addition to information about the applicant and the work the applicant proposes to do, information as to the cost and duration of the work, and in the case of new applicants the tax status of the organization that would administer the grant unless it is a recognized institution of higher education.

The Foundation has no deadlines or standard application forms. Often a brief letter of inquiry, rather than a fully developed proposal, is an advisable first step for an applicant, conserving his time and allowing the Foundation to give the applicant a preliminary response as to the possibility of support.

President's Statement

The Mayor of the City of New York is fond of asking "How am I doing?" Judging from the returns of the 1985 elections, a majority of the voters felt that he was doing very well indeed.

The Mayor's favorite question is a hard one for a foundation to answer, perhaps harder for a foundation than for any other kind of organization. There is nothing corresponding to election returns for a politician or a quarterly profit and loss statement for a business that gives an automatic, periodic measure of a foundation's performance. Even colleges and universities, although they are not for profit, have a number of indicators of success, such as the number of applications for admission, the SAT scores of entering freshmen, the achievements of their graduates, and the percentage of alumni who contribute to annual giving. Dollars of grants made are clearly not a good measure of foundation performance, since dollars can be spent wisely or foolishly. Occasionally books are published that purport to evaluate the performance of the large foundations, but they probably tell us more about how the author would run a foundation if he had the opportunity than they do about the foundations themselves.

Nevertheless, foundations do have indicators of their own performance, some of which are provided naturally in the course of day-to-day activity and some of which they devise. The exact nature of these indicators will vary with the nature of the foundation's program. The Sloan Foundation, which supports higher education and research, may be able to use indicators not available for other kinds of programs.

It should be said at the outset that Sloan, like other foundations, makes some grants that after the fact turn out to be bad ones. These include grants to write books that never get written, or grants to devise experimental courses that are dropped from the curriculum as soon as the grant funds are gone. Sometimes we make a grant for a book that does get written, but which we and others feel is disappointing. In our annual reports, we describe our grants without attempting to evaluate them, because we recognize that our evaluations may not be shared by the grantee or by others.

Of course, there is another type of error that is much harder to identify — the type that occurs when we decline a proposal that should have been funded. Some of these proposals will be supported by other funding agencies, or from the proposer's own resources and if the product is a good one, we may become aware that we missed an opportunity. Others never get funded and the work never gets done, so that it is impossible to know how it would have turned out. Errors of omission are inevitable in part because of the limits on our funds and in part because our judgment and that of those people we consult is fallible. Grantmaking is and will remain more of an art than a science.

Turning to the other side of the ledger, we can be confident we have

made a good grant when a book we have supported seems to us to be first rate and is well reviewed, or when a research grant produces several important articles in leading refereed journals. We also learn something reassuring when a new course developed with our financial assistance becomes a regular part of a college curriculum supported by the normal teaching budget.

There are also pleasant as well as unpleasant surprises. A grant that we made with some misgivings, perhaps after some internal disagreement, may turn out to produce a better outcome than any of us anticipated. A small grant for planning or exploration may lead eventually to a large and growing activity.

The evaluation of a large foundation program is far more difficult than the evaluation of an individual grant. Much depends on when the program is evaluated, and on the level at which the evaluation is made. Consider, for example, our Particular Program in Cognitive Science, now nearing its end. It is much too soon for any formal evaluation of this program. Yet in one sense, it is clearly a success. As a result, in part, of Foundation grants, there is now a large and lively intellectual enterprise called cognitive science involving people from a variety of older disciplines — philosophy, psychology, artificial intelligence, linguistics, neuroscience, and anthropology. These people are conducting interdisciplinary seminars and research, have formed a new learned society and a new scholarly journal, and are even beginning to offer undergraduate majors in cognitive science. But at a deeper level, it is not yet clear that all this enthusiasm and activity constitutes success. Do today's cognitive scientists understand the nature of the mind and the process of human thought better than seventeenth century philosophers did? Or will much of what they are doing ultimately prove to be excursions down blind alleys? It may not be possible to make this judgment for many years, and when it is made, much more than the Foundation's contribution will be judged.

Even a simpler program may appear to be more successful at first than after some years go by. From 1970 to 1974, the Foundation had a Particular Program for Minorities in Medicine. Shortly after the end of this program, the number of minority students in medical schools was rising substantially. Twelve years later, the number is decreasing, and medical educators are gravely concerned.

The Sloan Foundation has flexible procedures for the formal evaluation of its larger programs. Evaluations are not done on a fixed schedule and are not always done in the same way. Sometimes they are made by our own staff, and sometimes by one or more outside consultants. Such evaluations play a crucial role in helping the staff and the Trustees decide how long a program should continue, and in helping to shape new programs. We find that some of our programs receive high marks in such evaluations, while others get mixed reviews.

Unfortunately, even programs that are doing well and meeting real needs cannot be continued indefinitely. Particular programs were originally intended

to last five to seven years. In practice, some have lasted closer to ten years. Foundations are often accused of not staying with programs long enough — of planting seeds and refusing to nurture the seedlings. There is some truth to this complaint. But private foundations have limited resources not augmented by any regular inflow of new funds. The real value of these resources has been severely eroded by inflation in the past twenty years. If we continued all our successful programs longer than ten years, we would eventually reach a point at which we had no funds available to undertake any new initiatives. A foundation that never did anything new would be such a dull place that it would have great difficulty attracting a competent staff or able trustees. Without able staff and trustees, it would eventually lose the capacity to tell which programs should be ended because they no longer were worthwhile, either because there had been a subtle deterioration in the quality of the program, or because the needs of the sector the program serves had changed so that the program no longer met them.

Evaluation thus assists us in the weeding out that we must do to make room for renewal. But, of course, no evaluation, however thorough, can tell us what our goals should be. It can only suggest how well the goals we have set are being reached. The determination of the goals themselves remains the special responsibility of the Trustees.

R. Manning Brown, Jr., a member of the Board of Trustees for fifteen years, did not stand for reelection in June, 1985 because of illness, and died a few months later. We shall deeply miss his wise counsel and his congenial fellowship.

Two officers of the Foundation retired during 1985: Claire Armstrong, Assistant Treasurer after forty-seven years of service and James D. Koerner, Vice President after sixteen years. Both gave the Foundation exceptional skill, talent, and dedication.

Albert Reiss

President

Grants and Activities in 1985

Science, Technology, and Mathematics

For a number of years, the Foundation's support of science and engineering has been sharply restricted. We have felt that the costs of research in mainstream science and engineering, two fields that were once of primary interest to the Foundation, have moved well beyond our financial range and have become the responsibility of government, industry, and research institutions themselves. We do support projects and activities in these fields for which private financing is especially desirable, such as those having to do with public policy or public understanding rather than fundamental research. Our main support of research in science and engineering continued in 1985 to be through our cognitive science program and our science fellowship programs; but the year was nonetheless something of an exception in that the funds we invested in scientific research were substantially greater than they have been in previous years. The reasons for this shift in emphasis are discussed below.

In engineering we continued in 1985 to provide the same kind of support as we have since 1982. Almost all of it was through our New Liberal Arts Program, which is concerned with non-engineering students. Instruction in technology and the principles of engineering for undergraduate students who are majoring in the humanities and social sciences is the central concern of the New Liberal Arts Program. It involves only a handful of engineering educators working in a non-traditional corner of their field. We think this work is vitally important, but it is not generally regarded as conventional engineering. Beyond the New Liberal Arts Program, our support of engineering — a field that fortunately enjoys a high level of prosperity these days — remained modest indeed last year.

A Special Trustee Grant to Sloan-Kettering

$2,500,000 over five years

From 1945 to 1980, the Sloan Foundation maintained a special relationship with an institution that Alfred P. Sloan, Jr., helped establish — the Sloan Kettering Institute for Cancer research, one of two major divisions of Memorial Sloan-Kettering Cancer Center. During the 35 years of Sloan support, the Foundation contributed $35 million dollars for research to Sloan-Kettering (Alfred P. Sloan, Jr., contributed another $30 million personally). By 1980 the institution had become the premier private center in the world for cancer research and treatment. It had grown to such a size that the relatively small grants the Foundation made each year were less important than in previous years, especially when compared to the monies from federal sources and third-party payers that met most of a budget then approaching $200 million a year. We therefore stopped our annual contributions to Sloan-Kettering but left open the possibility of support for special purposes.

One such purpose appeared last year: the 100th anniversary of Memorial Hospital, the treatment division of the institution. To celebrate that notable event, Sloan-Kettering organized a 100th anniversary capital fund campaign. The Trustees of the Sloan Foundation considered it a pleasant obligation to contribute to this campaign and did so with this grant that was earmarked for the support of researchers working in three areas: molecular biology and virology, cell biology and genetics, and immunobiology. Our grant was further earmarked for promising young investigators who need two or three years to establish themselves and compete for federal support.

Molecular Studies in Evolution

While basic scientific research is the wellspring of technological advance, newly developed technologies may in turn revolutionize basic science. Such a possibility has now arisen in the study of evolution, which has played such a central role in biology since the time of Charles Darwin. For the first time, the powerful techniques of molecular biology are making it possible to unravel the millions of years of evolutionary history that are encoded in the genetic complement of living species. Evolutionary biology no longer need rely solely upon the incomplete fossil record and the often hard-to-interpret evidence from morphological comparisons. Each of these well-established approaches continues to have its own special strengths, but both can now be checked against wholly new scientific evidence arising from the rapidly developing methods of molecular biology.

Despite its scientific potential, the scale of molecular-level research on evolution remains quite small. This is due in part to its cross-disciplinary nature, requiring advanced knowledge of both molecular and evolutionary biology, and in part to the sparseness of available research funding. In 1985, the Foundation's staff consulted widely with leading molecular and evolutionary biologists, all of whom urged a Foundation initiative to stimulate an increased level of research activity in this area. In pursuit of this goal, we made the following grants:

Trustee Grants in Molecular Evolution

California Institute of Technology — **$75,500**
Pasadena, California 91125 — (over two years)

Dr. Roy Britten is a leading molecular biologist whose past work was responsible for some of the developments in molecular biology that have energized evolu-

tionary research. He now proposes to turn his attention again to the kinds of research approaches needed for illumination of evolutionary questions, seeking to apply some of the molecular biology techniques that have been developed over the past several years. His research will concentrate especially upon the extremes in the rates of evolutionary change in DNA: those fractions known to evolve quite rapidly and those known to evolve very slowly.

University of California, Berkeley **$60,000**
Berkeley, California 94720 (over one year)

Professor Vincent Sarich of Berkeley is both a biochemist and an anthropologist, and one of the research pioneers in molecular evolution. Professor Sarich proposes to develop new techniques that will make immunological and DNA hybridization techniques more accessible to evolution researchers, to expand the range of DNA hybridization techniques, and to investigate apparent differences in the rates of evolution of different species by applying immunological, DNA hybridization, and electrophoresis analyses to a larger variety of species.

Wayne State University **$60,000**
Detroit, Michigan 48202 (over one year)

Professor Morris Goodman of Wayne State University has received Sloan Foundation support for a three-phase project focused on the application of recombinant DNA and nucleotide sequencing techniques to the reconstruction of the phylogeny of humans, other primates and "lower" species such as rabbits and mice. All of these share genes coding for a particular protein, but these genes are expressed at different times in the various species. In addition to the laboratory-based sequencing work, the project involves large-scale computer analyses of the enormous volume of DNA sequence data that has now accumulated but has not yet been satisfactorily analyzed from an evolutionary perspective, and the writing of a book provisionally entitled Molecular Perspectives on Humankind's Ancestry and Evolution.

Yale University **$60,000**
New Haven, Connecticut 06520 (over one year)

Professor Charles Sibley of Yale University is an ornithologist who has pioneered the use for evolutionary research of a molecular technique called DNA-DNA hybridization. This involves molecular measurement of genetic "distance" between species by hybridizing single-strand DNA samples from two species and assessing their overall similarity. Such "brute-force" approaches have less scientific elegance than the sequencing methods used by many molecular biologists, but are simple enough to allow them to be automated and therefore applied to large numbers of species at low cost. Sibley has now applied his techniques to over 1,600 species of birds, and his findings have revolutionized scientific knowledge of the birds and have proved to be consistent with current knowledge of the earth's geological history. Sloan Foundation funds are being used to extend his work on birds to other species, including mammals, reptiles, frogs, and fish; and for the design, development or purchase of more accurate, computer-controlled instrumentation needed to expand his DNA hybridization work to these additional species.

One Officer Grant in Molecular Evolution

Columbia University **$5,000**
New York, New York 10027 (over one year)

This grant will support the costs of a planning group to conceptualize and organize a scientific conference in 1986 on future paths in the study of molecular evolution. The planning group will be chaired by Dean Robert E. Pollack of Columbia University and President Joshua Lederberg of Rockefeller University. The conference will seek to focus upon the questions most likely to be asked next at the intersection of molecular biology and microevolution, including the control of embryonic development as it has interacted with the process of evolution.

Population Sciences

The concept of a population is basic to many scientific disciplines, including genetics, population biology, demography, economics, epidemiology, ecology, mathematics, and statistics. Most of these disciplines apply quantitative techniques to the study of animal, human, plant, and microorganism populations, but to date there has been little joint research and knowledge transfer among them. In the belief that much could be gained from encouraging cross-disciplinary work among these separate but conceptually similar scientific approaches, the Foundation made a series of grants last year to encourage cross-disciplinary research in the population sciences.

Trustee Grants in Population Sciences

Duke University **$25,000**
Durham, North Carolina 27706 (over one year)

Duke is engaged in a three-part effort: the initiation of a bimonthly research seminar bringing together biological scientists and demographers working on population-based models; a visiting scientists seminar involving six two-day visits by prominent population biologists, mathematicians, geneticists, and demographers; and seed funding for exploratory research efforts on new mathematical models and innovative application of existing models in the mathematical, biological and demographic sciences. (Project director: George C. Myers, Director of the Center for Demographic Studies.)

Stanford University **$225,000**
Stanford, California 94305 (over three years)

Stanford University has established an interdisciplinary committee on population studies that includes biology, mathematics, economics, demography, population genetics, epidemiology, operations research, statistics, etc. Sloan Foundation support has been provided primarily as seed money in support of this faculty-wide initiative, and should be sufficient to initiate three to four cross-disciplinary studies per year, each of which would need to generate additional funding from other sources. In addition, the funds will be used to support an annual dissertation fellowship to encourage cross-disciplinary research at the dissertation level. The general goal of the Stanford effort is to create an intellectual climate that fosters joint work among these various disciplines, with special emphasis on the nexus of statistics, population genetics, and epidemiology. (Project director: W. Brian Arthur, Professor of Population Sciences.)

University of California, Berkeley **$24,700**
Berkeley, California 94720 (over one year)

Berkeley has established a working group in population studies directed towards human and non-human populations in the widest sense. Activities include: a series of campus visits by scientists currently involved in important research in population modeling in ecology; a working-paper series of interdisciplinary papers; a bibliographic exchange to help Berkeley participants locate relevant references outside their own disciplinary specialties; and the encouragement of additional faculty members to participate in ongoing faculty research seminars. A significant degree of cross-disciplinary research has already been established as a result of this initiative. (Project director: Kenneth W. Wachter, Professor of Demography and Statistics.)

University of California, Davis **$24,700**
Davis, California 95616 (over one year)

Davis plans to build upon its strength in population biology and ecology by pursuing the application of quantitative population ideas in the social sciences, and the application of advanced mathematical techniques to population biology, agriculture, economics, and forestry/fisheries. Two faculty seminar series are contemplated, with a parallel set of two graduate seminars tailored to review the faculty seminar papers and provide opportunities for related work by graduate students. Consideration also is being given to a cross-disciplinary working paper series. (Project director: Peter J. Richerson, Professor of Environmental Studies.)

University of Michigan **$25,000**
Ann Arbor, Michigan 48109 (over one year)

Interested faculty at the University of Michigan have organized a cross-disciplinary program in the population sciences, involving participants from biology, ecology, natural resources, mathematics, statistics, demography, economics, epidemiology, and genetics. Activities include: an informal seminar on mathematical population modeling; an annual guest lecture series in a population-based discipline of interest to a wide campus audience; short-to-medium term visits and seminar presentations by well-established interdisciplinary researchers; partial support for a cross-disciplinary post-doctoral position; pre-doctoral support for broad cross-disciplinary preparation in a relevant area; and modest release time and travel expenses to a faculty member wishing to explore interdisciplinary connections. (Project director: Albert I. Hermalin, Director of the Population Studies Center.)

University of Pennsylvania **$22,485**
Philadelphia, Pennsylvania 19104 (over one year)

There are seven faculty members at the University of Pennsylvania whose interests include cross-disciplinary population research. Research foci include the inheritance of traits such as epilepsy and IQ as a population process; reassessment of the classical nature-nurture debate using a mathematical model originally proposed by R.A. Fisher; and assessment of the two-sex problem in formal demography. Sloan Foundation funds are being used for modest research assistance and travel and for the costs of a working paper series. (Project director: Samuel Preston, Director, Population Studies Center.)

University of Texas **$25,000**
Austin, Texas 78712 (over one year)

The Texas project involves two interrelated activities — an ongoing cross-disciplinary faculty seminar and a sequence of two conferences — focusing on population models and analyses broadly conceived. The effort includes the Department of Botany, the interdisciplinary Population Research Center, and the Ilya Prigogine Center for Studies in Statistical Mechanics (with the active involvement of the Center's founder, Nobel-Laureate Ilya Prigogine). Texas has deliberately construed the subject matter very broadly: attention to mathematical diffusion models includes their application to molecules, gases, disease organisms, and economic innovations; and interaction models are to be applied broadly to predator-prey relations, human groups, and molecular interactions in physical chemistry. (Project directors: Kenneth C. Land, Professor of Finance; and Patrick L. Brockett, Associate Professor of Finance.)

Officer Grants in Population Sciences

Hoover Institution on War, Revolution and Peace **$30,000**
Stanford, California 94305 (over one year)

All industrialized countries (both West and East) are now experiencing very low levels of fertility, and these may have important implications for their economies, for financing of their social security systems, and generally for those economic and social areas affected by changes in age composition. This grant provided partial support for a conference on the "Causes and Consequences of Non-Replacement Fertility," organized by Kingsley Davis, Mikhail S. Bernstam, and Rita Ricardo-Campbell, and attended by many of the world's leading demographers and economists engaged in relevant research.

Population Council **$20,000**
One Dag Hammarskjold Plaza (over one year)
New York, New York 10017

One of the weaknesses in the standard methodology of demographic projection is that the assumed annual fertility levels do not adequately reflect changes in the timing and spacing of childbearing among women of different ages. If women of reproductive age delay their childbearing, as has been happening in the United States, Western Europe, China and elsewhere, these annual fertility

rates may be greatly affected while the same women's ultimate family size changes far less. This project seeks to develop a "translation model" to allow alternative assumptions about timing and spacing of births to affect the annual fertility rates incorporated in population projections. Such a model would represent a significant improvement in the technology of demographic projection as it applies to industrialized and developing countries, and would also be of great utility in assessing the relative significance of deferment versus limitation of births in countries such as China. (Project director: John Bongaarts, Senior Associate.)

Russell Sage Foundation **$5,600**
112 East 64th Street (over one year)
New York, New York 10021

Planning for the 1990 Census of the United States has been underway for several years, and much will be finalized by 1987. This grant supported a workshop bringing together with senior staff of the Census Bureau those researchers commissioned to prepare comprehensive reports on a wide range of important topics based on 1980 Census data, so as to assure that insights drawn from analyzing the 1980 data would be fully incorporated into the planning process for the 1990 Census. The workshop was organized by the National Committee for Research on the 1980 Census, which has been supported in part by the Sloan Foundation. (Project director: Peter E. deJanosi, Vice President.)

Other Trustee Grants in Science, Technology, and Mathematics

American Academy of Arts and Sciences **$300,000**
Norton's Woods, 136 Irving Street (over two years)
Cambridge, Massachusetts 02138

The International Institute for Applied Systems Analysis (IIASA), located near Vienna, was established in 1973. The United States first proposed its creation and has always been an active member. IIASA brings together scholars and practitioners from many backgrounds and countries for collaborative studies of such global problems as energy supply, environmental management, urbanization, aging, and regional planning. Until 1983 the participation of the United States took place through the National Academy of Sciences with financing from the National Science Foundation, which withdrew its support that year. The American Academy of Arts and Sciences, believing that the continued

membership of the United States in IIASA was important, assumed the U. S. membership in 1983 with the help of a Sloan grant for general support that ended last year. This second grant will help support a research project on the global economy and the world environment — a topic of equal importance to East and West — and will focus on four major questions: the impact of economic development on the natural biosphere over the next century; the technological initiatives that might be taken to relax environmental constraints and expand opportunities for development of the biosphere; the institutional improvements needed to improve society's ability to manage environmental and economic interdependence; and the actions needed to improve the design of long-term, large-scale development strategies. The project aims to serve the needs of policy makers and planners in government and private industry who must deal with conflicts between development objectives and environmental restrictions in the face of scientific uncertainty and minimal social consensus. (Project director: William C. Clark, IIASA, A-2361 Laxenburg, Austria.)

California Institute of Technology — **$55,000**
Pasadena, California 91125 — (over three years)

University of California, Berkeley — **$55,000**
Berkeley, California 94720 — (over three years)

The explosive growth of federal support for scientific research since World War II has brought fundamental changes in the nature of scientific work that are still not well understood. One of the principal engines of change has been, of course, the enormous requirements of national security. This grant will support a study to be done jointly at Caltech and Berkeley of the ways in which American science has been shaped, institutionally and intellectually, by the demands of national security; and conversely how national security policies have been influenced by science. The focus of the study will fall chiefly on the nuclear-related sciences, including high-energy physics, nuclear chemistry, health physics, and radiation biology. (Project directors: Daniel Kevles, Professor of History at Caltech; and John L. Heilbron, Professor of History at Berkeley.)

Center for Advanced Study in the Behavioral Sciences — **$300,000**
202 Junipero Serra Boulevard — (over three years)
Stanford, California 94305

Since its inception in 1954, the Center for Advanced Study in the Behavioral Sciences has been remarkably successful in stimulating interdisciplinary research. Its institutional formula is quite simple: each year about 50 distinguished scholars from many disciplines spend a year in residence at the Center free of their normal duties. Many of the Center's interdisciplinary collaborations are prearranged; others come about through the sustained proximity of independent scholars who discover a convergence of interests during their year in residence. Because many of the Sloan Foundation's activities in science are interdisciplinary, a natural alliance between the Foundation and the Center has developed over the years. This grant is the fourth we have made the Center since 1979. Our previous grants have supported work in artificial intelligence, cognitive science, mathematical linguistics, mathematical models of cultural evolution, and other interdisciplinary study. The 1985 grant will support interdisciplinary groups for work in neuroscience, cognitive science, applied mathematics, economics, and statistics. (Project director: Gardner Lindzey, Director of the Center.)

Cold Spring Harbor Laboratory — **$74,000**
Cold Spring Harbor, New York 11724 — (over four years)

This institution has sponsored a summer internship in biochemistry and molecular biology for undergraduates since 1959. The program offers its interns an intense experience in research, which can be of great value for young students considering a career in science. The summer season at the Laboratory provides a stimulating environment. Upwards of 3,000 scientists from around the world attend professional meetings and advanced training courses. Thus the undergraduate interns have an opportunity to learn the latest experimental techniques and to seek advice about their own training. They also work one-to-one with a staff scientist at the Laboratory. The program has been markedly successful, and many of those who have taken part in it have gone on to outstanding careers in science. This grant will meet half the costs of the program over four years. (Project director: James D. Watson, Director of the Laboratory.)

GMI Engineering and Management Institute — **$250,000**
1700 West Third Avenue — (over two years)
Flint, Michigan 48502

Schools of engineering are beginning to offer degree programs in manufacturing systems engineering, in response to the needs of industry. Computer-aided design, robotics, numerical control machines, new materials, nontraditional machining, as well as increased concern for personnel hazards, energy conservation, and environmental pollution — all are inducing changes in manufacturing technology. Few of the new programs are for undergraduates and none is a cooperative program alternating between school and work. The GMI Institute,

now an independent school of engineering, plans to offer a new cooperative degree, the Bachelor of Science in Manufacturing Systems Engineering, in 1986. By definition it will draw on many engineering fields: electrical, mechanical, industrial, automotive, transportation, and heavy equipment, as well as on business administration. This grant will meet part of the Institute's costs in completing the curriculum. (Project director: William B. Cottingham, President.)

Harvard University **$118,000**
Cambridge, Massachusetts 02138 (over two years)

Many students in introductory courses in multivariable calculus find it extremely difficult to picture and to graph surfaces in three dimensions; yet the ability to visualize surfaces in three-dimensional space is essential to an understanding of basic concepts in calculus. Microcomputers may offer help, in the opinion of two senior members of the Harvard faculty: Andrew W. Gleason, Professor of Mathematics and Natural Philosophy, and Harry R. Lewis, Professor of Computer Science. For several years they have experimented with microcomputer programs written by others in multivariable calculus. They have found them unsatisfactory but are persuaded of the potential value of the microcomputer for this subject. Our grant will help them write their own programs.

Institute for Advanced Study **$110,000**
Princeton, New Jersey 08540 (over one year)

The School of Mathematics at the Institute for Advanced Study has long been a leading international center for research and post-doctoral training in pure mathematics. Its permanent faculty, which in the past has included Albert Einstein, John von Neumann, Herman Weyl, and Kurt Gödel, continues to be among the most distinguished in the world. Each year small groups of senior mathematicians and young scholars come together at the Institute to work on a specific topic. In 1981 the Foundation made a grant to the Institute of $150,000 to support a visiting scholar program in algebraic geometry. The present grant will support two similar programs in the 1985-86 academic year, one on topics in number theory and one on the theory of partial differential equations. (Project director: Harry Woolf, Director of the Institute.)

Massachusetts Institute of Technology **$250,000**
Cambridge, Massachusetts 02139 (over two years)

The Foundation has been concerned for many years with ways of improving the public's understanding of the major fields in which the Foundation is active. It

is a problem because these fields are technical and quantitative and appear to laymen to be inaccessible. One way the public's understanding of science and technology might be improved is indirectly through the education of those who report these fields in the print and electronic press. In 1982 the Sloan and Mellon Foundations made grants to M.I.T. for the establishment of a program called the Vannevar Bush Fellowships in the Public Understanding of Technology and Science. The program brings to M.I.T. each year a small group of practicing journalists with some experience in, or a serious interest in, writing for a lay audience about science and technology. They take part in an intensive program of work in science and technology tailored to the needs of working journalists; and they make the acquaintance of a large number of M.I.T. faculty members to whom they can turn in the future for explanations of technical developments. The program is working well and the Foundation renewed its grant in 1984 and again last year. (Project director: Victor K. McElheny.)

Officer Grants in Science, Technology, and Mathematics

American Academy of Arts and Sciences **$30,000**
Norton's Woods, 136 Irving Street (over one year)
Cambridge, Massachusetts 02138

For a symposium commemorating the 100th anniversary of the birth of Niels Bohr. (Project director: Herman Feshbach, President.)

American Mathematical Society **$30,000**
P. O. Box 6887 (over one year)
Providence, Rhode Island 02940

Partial support for the costs of the 1986 International Congress of Mathematicians. (Project director: Jill P. Mesirov, Executive Director.)

Columbia University **$10,000**
New York, New York 10027 (over one year)

Partial support for completion of a book on Albert Einstein. (Project director: Fritz Stern, Professor of History.)

Harvard University — **$20,000**
Cambridge, Massachusetts 02138 — (over one year)

For an analysis of survey and case-study data on the relationships between universities and industry in biotechnology. (Project director: David Blumenthal, Executive Director of the Center for Health Policy and Management.)

Hudson River Foundation — **$20,000**
122 East 42nd Street
New York, New York 10168 — (over two years)

For an international symposium on biotic impoverishment. (Project director: G. M. Woodwell, Director of the Woods Hole Research Center.)

International Student Pugwash — **$20,000**
505-B Second Street, N. E.
Washington, D. C. 20002 — (over one year)

For a conference entitled "Science, Technology, and Individual Responsibility." (Project director: David C. Leifer, Executive Director.)

Mathematical Association of America — **$18,950**
1529 Eighteenth Street, N. W.
Washington, D. C. 20036 — (over one year)

For a survey of national resources in collegiate mathematics. (Project director: Alfred B. Willcox, Executive Director.)

Mathematical Sciences Research Institute — **$10,500**
1000 Centennial Drive
Berkeley, California 94720 — (over one year)

For a physics and mathematics workshop on "Strings and Riemann Surfaces." (Project director: Irving Kaplansky, Director of the Institute.)

New York Academy of Sciences — **$10,000**
2 East 63rd Street
New York, New York 10021 — (over one year)

For a conference on the theory of quantum measurement. (Project director: Daniel Greenberger, Professor of Physics at the City College of New York.)

Research Foundation of the State University of New York — **$30,000**
P. O. Box 9 — (over one year)
Albany, New York 12201

For a conference on new approaches to the teaching of college calculus. (Project director: Ronald G. Douglas, Professor of Mathematics, SUNY, Stony Brook.)

Research Foundation of the State University of New York — **$18,500**
P. O. Box 9 — (over one year)
Albany, New York 12201

For a study of the influence of computer science on precollegiate mathematics. (Project director: Anthony Ralston, Professor of Computer Science and Mathematics, State University of New York, Buffalo.)

University of California, Santa Cruz — **$18,000**
Santa Cruz, California 95064 — (over one year)

For the development of new courses in science, technology, and mathematics. (Project director: Robert L. Sinsheimer, Chancellor.)

University of Colorado — **$4,500**
Boulder, Colorado 80309 — (over one year)

For organizing and classifying the papers of the mathematician, Stanley M. Ulam. (Project director: Jan Mycielski, Professor of Mathematics.)

University of Maryland — **$25,000**
College Park, Maryland 20742 — (over two years)

For a symposium on Isaac Newton on the occasion of the tri-centenary of the *Principia*. (Project director: Susan Zimmerman, Executive Director of the Center for Renaissance and Baroque Studies.)

University of New Mexico — **$20,000**
Albuquerque, New Mexico 87131 — (over one year)

For a book on the mathematization of modern thought. (Project director: Reuben Hersh, Professor of Mathematics.)

University of Washington **$18,700**
Seattle, Washington 98195 (over one year)

For an evaluation of instructional software in introductory college physics. (Project director: Joseph E. Rothberg, Professor of Physics.)

University of Wyoming **$12,000**
Laramie, Wyoming 82071 (over one year)

For a conference entitled "New Directions in Applied and Computational Mathematics." (Project director: Kenneth I. Gross, Head of the Department of Mathematics.)

Wellesley College **$20,000**
Wellesley, Massachusetts 02181 (over one year)

For experiments in the use of video technology in undergraduate science courses. (Project director: Theodore W. Ducas, Professor of Physics.)

Yale University **$10,000**
New Haven, Connecticut 06520 (over one year)

For an evaluation of the undergraduate science curriculum. (Project director: Sidney Altman, Dean of the College.)

Science Book Program

This program, initiated in 1975, is one of the Foundation's several continuing efforts to advance the public understanding of science. Under the terms of the program, the Foundation invites particularly accomplished and articulate scientists to write about the character of their lives in science. Although the form of these accounts is left in each instance to the author, the general aim of all the books in the series is to make the intimate experience of doing scientific work less mysterious to non-scientists and to give laymen a better sense of what a life is like when it is dedicated to science.

In 1985, one new book was published in the series: *Enigmas Of Chance* by the late mathematician, Mark Kac. Professor Kac had been a good friend and

advisor to the Foundation for many years; it is therefore particularly rewarding to add this warm and rich account of his life in mathematics to the books previously published:

In Search of Mind by Jerome Bruner

Haphazard Reality by Hendrik B.G. Casimir

Disturbing the Universe by Freeman Dyson

A Slot Machine, A Broken Test Tube by S.E. Luria

Advice to a Young Scientist by P.B. Medawar

The Youngest Science by Lewis Thomas

In deciding upon invitations to the series and reviewing manuscripts, the Foundation is ably assisted by an advisory committee currently constituted as follows:

Robert Sinsheimer, Chancellor of the University of California, Santa Cruz, chairman of the committee

Michael Bessie, Publisher, Cornelia & Michael Bessie Books

Howard H. Hiatt, Professor of Medicine, Harvard Medical School and Harvard School of Public Health

Eric Kandel, University Professor of Physiology and Psychology, Columbia University

Daniel Kevles, Professor of History, California Institute of Technology

Robert Merton, University Professor Emeritus and Special Service Professor, Columbia University

Paul Samuelson, Institute Professor of Economics, Massachusetts Institute of Technology

Stephen Weinberg, Josey Regental Professor of Science, University of Texas

Stephen White, foundation officer (retired), writer

Two Fellowship Programs for Young Researchers

Sloan Research Fellowships

$2,250,000 over two years

The Foundation's program known as Sloan Research Fellowships entered its 31st year in 1985, making it one of the oldest fellowship programs in the country and by far the oldest program of the Sloan Foundation. It has grown in size and cost over the years, but its purpose remains what it was in 1955: to stimulate fundamental research by young scholars of outstanding promise at a time in their careers when their creative abilities are especially high and when federal or other support may be difficult to secure. An evaluation of the Sloan Research Fellowships that was carried out a few years ago by the Sloan staff, together with the kind of informal evaluation that comes to us in the normal course of work, gives the Foundation confidence in this program as well as satisfaction with the reputation the program enjoys in the academic world.

These yearly awards are now made in five fields: physics, chemistry, mathematics, neuroscience, and economics. The size of the award was increased in 1982 to $25,000, where it has remained. The funds are administered by the fellow's institution and are normally spent over two years in a way that permits the fellow the greatest possible freedom and flexibility. The fellow need not pursue a specified research project and is free to change the direction of his research at any time. The award may be used for equipment, summer support, professional travel, computer time, research assistants, or other purposes approved by the fellow's institution. Former fellows report that this flexibility often gives the awards a value well beyond their dollar amount. They also report that the early recognition of outstanding promise which the fellowship confers, after years of arduous preparation, is an incomparable stimulus to their careers. A leaflet entitled "Sloan Research Fellowships" gives details about this program and is available from the Foundation.

With last year's awards, the Foundation has spent about $43 million since 1955 to assist 2,100 young researchers at 175 institutions in the United States and Canada. Among the alumni of this program are 10 Nobel laureates and the holders of many other distinguished awards in their fields. Candidates for Sloan Research Fellowships are nominated by senior scholars familiar with their work. For the 1985 awards, 400 nominations were reviewed by a committee of senior scientists and economists, as follows:

Chemistry
Ronald Breslow, Professor of Chemistry, Columbia University
Robin M. Hochstrasser, Professor of Chemistry, University of Pennsylvania
Richard H. Holm, Professor of Chemistry, Harvard University

Economics
Richard Quandt, Professor of Economics, Princeton University
Michael Rothschild, Professor of Economics, University of California, San Diego
James Tobin, Professor of Economics, Yale University

Mathematics
Peter D. Lax, Professor of Mathematics, New York University
John W. Milnor, Professor of Mathematics, Institute for Advanced Study
David Mumford, Professor of Mathematics, Harvard University

Neuroscience
Gerald D. Fischbach, Professor of Neuroscience, Washington University
Patricia S. Goldman-Rakic, Professor of Neuroscience, Yale University
Solomon H. Snyder, Professor of Neuroscience, The Johns Hopkins University

Physics
Hans Frauenfelder, Professor of Biophysics, University of Illinois at Urbana-Champaign
Malvin A. Ruderman, Professor of Physics, Columbia University
Kenneth G. Wilson, Professor of Physical Science, Cornell University

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The following scholars, listed by institution and field, received the 1985 awards:

Brandeis University
Economics: Jeffrey Williams

Brown University
Chemistry: Richard M. Stratt

California Institute of Technology
Economics: Jennifer F. Reinganum

City University of New York, Lehman College
Mathematics: John Smillie

Colorado State University
Chemistry: David F. Kelley

Columbia University
Neuroscience: Michael S. Levine
Lorna W. Role

Cornell University
Physics: James P. Sethna

Duke University
Neuroscience: David Fitzpatrick

Georgia Institute of Technology
Physics: Ahmet Erbil

Harvard University
Chemistry: David Ronis
Economics: Lawrence H. Summers
Physics: Luis Alvarez-Gaume
Lawrence Hall
Stephen M. Kent

Indiana University
Physics: Leslie C. Bland

Institute for Advanced Study
Physics: Piet Hut

Johns Hopkins University
Mathematics: Robert W. Thomason
Neuroscience: Ronald J. Tusa

Massachusetts Institute of Technology
Economics: Jean Tirole
Mathematics: David Jerison

Michigan State University
Mathematics: Lai-Sang Young

New York University
Mathematics: Russel E. Caflisch

Northwestern University
Economics: Kenneth L. Judd

Ohio State University
Chemistry: Bruce E. Bursten
Mathematics: Karl Rubin

Princeton University
Economics: Michael Katz
Carl Shapiro
Mathematics: David E. Barrett
Nicholas J. Kuhn
Physics: Daniel L. Stein

Purdue University
Chemistry: Dale L. Boger

Rice University
Chemistry: R. Bruce Weisman

Rutgers University
Mathematics: R. Michael Beals

Stanford University
Chemistry: Nathan S. Lewis
Mathematics: Brian White
Neuroscience: Stephen J. Peroutka
Physics: J. Richard Bond

State University of New York, Stony Brook
Neuroscience: William T. Newsome
Physics: Adam Burrows

Syracuse University
Mathematics: Terry R. McConnell

University of California, Berkeley
Mathematics: Robert F. Coleman
Neuroscience: S. Marc Breedlove
Hsiao-ping H. Moore
Physics: Imke dePater

University of California, Davis
Chemistry: Philip P. Power
Robert N. Rosenfeld

University of California, Irvine
Neuroscience: Stewart H. C. Hendry

University of California, Los Angeles
Neuroscience: Patrick W. Mantyh
Physics: Robert Cousins

University of California, San Diego
Physics: Douglas Toussaint

University of California, Santa Barbara
Physics: Gary Horowitz

University of Chicago
Mathematics: Charles J. Amick
Andrejs Treibergs

University of Illinois, Chicago
Mathematics: Steven E. Hurder

University of Illinois, Urbana-Champaign
Chemistry: Scott E. Denmark
Kenneth S. Suslick
Physics: Steven M. Errede

University of Iowa
Chemistry: David F. Wiemer
Neuroscience: Alan Randich

University of Maryland
Mathematics: Michael S. Vogelius

University of Massachusetts
Neuroscience: Eric L. Bittman

University of Michigan
Physics: Thorne Lay

University of Minnesota
Chemistry: Thomas R. Hoye
Mathematics: Jack F. Conn
Dennis W. Stanton

University of Missouri, Columbia
Physics: Meera Chandrasekhar

University of Nebraska
Chemistry: Raymond L. Funk

University of New Mexico
Chemistry: Carlos J. Bustamante

University of North Carolina
Chemistry: Thomas N. Sorrell

University of Oregon
Chemistry: Geraldine L. Richmond

University of Pennsylvania
Mathematics: Ted C. K. Chinburg
Dennis M. DeTurck
Physics: William Molzon

University of Pittsburgh
Chemistry: Dennis P. Curran
Neuroscience: John P. Horn

University of Texas, Austin
Chemistry: Richard A. Jones
Physics: Joseph Polchinski
Donald E. Winget

University of Utah
Chemistry: Joel M. Harris
Chris M. Ireland

University of Virginia
Neuroscience: Sally Ann Moody

University of Washington
Physics: Marcel den Nijs
Blayne R. Heckel

Virginia Commonwealth University
Chemistry: James Terner

Washington University
Neuroscience: Paul H. Taghert

Yale University
Chemistry: Stuart L. Schreiber
Economics: Donald W. K. Andrews
Neuroscience: Mriganka Sur
Physics: Roderick V. Jensen

Sloan Dissertation Fellowships

$835,000 over one year

Federal support of fellowships for doctoral candidates in the physical and social sciences has declined sharply from its peak in the 1970s. To help fill the gap, we established a new program in 1984, the Sloan Dissertation Fellowships, to assist Ph.D. candidates in two fields of traditional interest to the Foundation: mathematics and economics.

Completing the dissertation is normally a time-consuming scholarly task that is performed with great difficulty amidst the candidate's teaching duties and other obligations. The Sloan awards give their recipients the freedom they need to finish their degrees. Nominations for these awards are solicited each year from the heads of leading graduate departments of mathematics and economics; 88 nominations were received last year and 50 awards of $11,000 plus full tuition each were made. The nominations were reviewed by the following committee of scholars:

Economics
Alan J. Auerbach, Professor of Economics, University of Pennsylvania
Peter A. Diamond, Professor of Economics, Massachusetts Institute of Technology
Lawrence J. White, Professor of Economics, New York University

Mathematics
F. Thomas Farrell, Professor of Mathematics, Columbia University
Benedict Gross, Professor of Mathematics, Brown University
Robert C. Gunning, Professor of Mathematics, Princeton University
Jacob Schwartz, Professor of Mathematics, New York University

The following scholars, listed by institution and field, received the 1985 awards:

Brown University
Mathematics: Richard M. Freije
Kieran G. O'Grady

California Institute of Technology
Economics: Jeffrey S. Banks
Mathematics: Jeffrey A. Aquilera

City University of New York
Mathematics: Andrea Sorbi

Cornell University
Mathematics: Bruce K. Driver

Duke University
Economics: Fallaw B. Sowell

Harvard University
Economics: James Bradford DeLong
Eddie Dekel
James R. Hines, Jr.
Mathematics: Ezra Getzler
Jeremy Teitelbaum

Johns Hopkins University
Mathematics: Hirotaka Tamanoi

Massachusetts Institute of Technology
Economics: Robert H. Gertner
Jeffrey K. MacKie-Mason
David S. Sharfstein
Mathematics: Frederic V. Bien
Jonathan F. Buss
It-Beng Tan

New York University
Mathematics: Zhengfang Zhou

Northwestern University
Economics: Nathan S. Balke
Daniel P. McMillen
Janet L. Mitchell

Princeton University
Economics: Sheena M. McConnell
James C. Dow
Raymond J. Farrow
Mathematics: Alejandro Adem
Matei Machedon

Rutgers University
Mathematics: Heinz Schaettler

Stanford University
Economics: Bronwyn Hall
Garey Ramey
Valerie Ramey
Mathematics: Michael Wolf

State University of New York, Stony Brook
Mathematics: Rong-hui Ji
Ji-ping Sha

University of California, Berkeley
Economics: Kenneth Alan Froot
Mathematics: Jose F. Escobar
Geoffrey Mess

University of California, San Diego
Economics: Jeffrey M. Wooldridge

University of Maryland
Mathematics: Jan J. Winnicki

University of Michigan
Economics: Michael P. Leidy
Mathematics: Cay S. Horstmann

University of Minnesota
Mathematics: Adolfo Quiros

University of Pennsylvania
Economics: Allen Schirm
Mathematics: Alexander Kaplan

University of Rochester
Economics: Vittorio Grilli

University of Washington
Mathematics: Paul F. Ringseth

University of Wisconsin
Economics: Paul Wood

Yale University
Economics: Julie Lynn Anderson
Steven N. Durlauf

The Cognitive Science Program

This program is the largest and longest of the seven "particular programs" the Foundation has undertaken since 1969. Its central purpose is to support the advancement and integration of those disciplines that attempt to understand the basis of intelligent behavior: cognitive psychology, neuroscience, linguistics, analytic philosophy, computer science, artificial intelligence, and cognitive anthropology. The program is therefore concerned with nothing less than man's understanding of his own mental make-up; with the complex and little understood processes by which human beings reason, remember, acquire language, solve problems, make decisions, and take actions on the basis of information the brain receives through the sensory organs.

The program began in 1977 with grants in academic fields that at the time were only loosely related. The Foundation's early grants helped researchers begin to work together and to develop some understanding of the concepts and methods of one another's disciplines. From these interdisciplinary beginnings many new lines of research emerged. The program entered its second phase in 1979 with major grants to institutions for the development of postdoctoral training programs. The third and final phase of our program began in 1981, overlapping with phase two, and is expected to extend through the 1987-88 academic year. Grants in this last phase of the program concentrated in 1985, as in previous years, on institutional development: on the establishment at each university of a self-sustaining center where a long-term program of training and research in cognitive science will be carried out after the Foundation's support comes to an end.

To ensure the orderly development of phase three, the Foundation's Trustees took the unusual step in 1981 of identifying those universities to which grants were expected to be made throughout the final phase of the program, and of committing the Foundation to these grants, totaling $10 million, as proposals were perfected and approved individually in the future. When the final grants are made in phase three, the Foundation will have invested over $20 million in this new field of intense interest to both laymen and professionals.

An outside advisory committee of the following persons assists the Foundation in all aspects of the program:

Robert Q. Marston, President, University of Florida, chairman of the committee

Theodore H. Bullock, Professor of Neurosciences, University of California, San Diego

Jerome A. Feldman, Professor of Computer Science, University of Rochester

William Kessen, Professor of Psychology, Yale University

William A. Nierenberg, Director, Scripps Institution of Oceanography

Sherwood Washburn, Professor Emeritus of Anthropology, University of California, Berkeley

Trustee Grants in Cognitive Science

Linguistic Society of America — **$100,000**
1325 18th Street, N. W. — (over two years)
Washington, D. C. 20005

During the long course of the cognitive science program, the Foundation has come to recognize that the principal obstacle to interdisciplinary research in the cognitive sciences is the size of the educational commitment necessary for specialists in one cognitive discipline to learn the methodological techniques and theoretical principles in the adjacent cognitive disciplines. This grant to the Linguistic Institute of America is one of several designed to address this problem. For over 50 years, the LSA has run a successful summer institute combining intense graduate level courses with faculty workshops on advanced research topics. The 1986 institute will focus on computational approaches to theoretical and applied linguistics. The computational approach to linguistics requires proficiency in fields such as discrete mathematics, formal logic, computer science, and artificial intelligence. The Foundation's grant will be used to support workshops providing high level training in all these fields at the 1986 summer institute. (Project director: Terry Langendoen, Professor of Linguistics, CUNY Graduate School.)

Massachusetts Institute of Technology — **$1,000,000**
Cambridge, Massachusetts 02139 — (over three years)

M.I.T. has long been a leader in cognitive science with particular strengths in the linguistic, psychological and philosophical analysis of language. The Institute has occupied a prominent position in all phases of the cognitive science program, receiving in phase three a grant of $1.5 million for the development of a center of research and training in cognitive science. This center has now been successfully established. The principal initiatives supported by the Foundation's grant were the installation of a multi-user, computer-based laboratory for experimental research, and the development of a valuable program of post-doctoral fellowships and visiting scientists. Foundation funds have also supported faculty

seminars, seed grants for faculty and student research, and a highly active publication series. The Foundation extensively reviewed all of these activities last year and approved a renewal grant of $1 million. (Project director: Jay Keyser, Professor of Linguistics.)

Stanford University **$500,000**
Stanford, California 94305 (over three years)

Stanford has long had impressive strengths in the individual cognitive sciences plus an unusual tradition of interdisciplinary cooperation in cognitive science that has made the university a strong contender for support throughout our program. The Foundation has made three previous grants to Stanford, the most recent a grant of $500,000 under phase three to develop an interdisciplinary program of instruction in cognitive science. This program is now up and running very effectively. A minor in cognitive science is now available to graduate students in computer science, linguistics, philosophy and psychology. An impressive number of jointly taught courses are available across departments and there are plans for an undergraduate major called "symbolic systems" that will include courses from four departments. The whole program was favorably reviewed by the Foundation last year and a renewal grant of $500,000 was made. (Project director: Ellen Markman, Professor of Psychology.)

Computational Neuroscience

As the Foundation's program in cognitive science moves through its final stage, the Trustees have recognized a special opportunity to encourage the application of theoretical techniques developed in cognitive science to empirical problems arising out of neuroscience, a related field in which Sloan had an earlier "particular program." Although neuroscience has made great strides in charting the anatomy and physiology of the nervous system, it has been much less successful in achieving an understanding of how the nervous system functions to produce adaptive and intelligent behavior. Recently, a small group of neuroscientists has begun to approach these problems by using computer simulation, mathematical modelling, and other computational techniques to study the function of single nerve cells, small networks of cells, and larger neural systems such as those underlying vision and coordinated action. The Foundation's program in computational neuroscience—a subdivision of our particular program in cognitive science—is designed to nurture both the development and testing of computational theory of nervous system functioning. In 1985, we

committed about $750,000 to grants in this area and we expect to increase this amount to $1 million in each of the next two years.

Trustee Grants in Computational Neuroscience

Cold Spring Harbor Laboratory **$140,000**
P. O. Box 100 (over three years)
Cold Spring Harbor, New York 11724

In early 1985, the Foundation made an officer grant to Cold Spring Harbor Biological Laboratory to run a summer graduate course in computational neuroscience on a trial basis. This experiment involved 25 students and half as many instructors from diverse fields including physics, engineering, robotics, artificial intelligence, and neurobiology. Evaluations of the course from both students and instructors were uniformly positive. Accordingly, the Foundation made this Trustee grant to support the continuation of the course for another three years. We anticipate that the addition of a laboratory component to the course, the development of which is supported by a grant to M.I.T. described below, will strengthen this course even further. Although a brief summer course cannot by itself provide the extensive training required for significant work in computational neuroscience, it can play a role in alerting students from different fields to the computational techniques that can be applied in neuroscience and therefore deserve further study. (Project director: Susan Hockfield, Cold Spring Harbor Summer Neurobiology Program.)

Massachusetts Institute of Technology **$180,000**
Cambridge, Massachusetts 02139 (over three years)

The study of computational neuroscience requires interdisciplinary training in areas ranging broadly over mathematics, physics, engineering, computer science, psychophysics, and neuroscience. These training requirements pose a significant barrier to entry for many excellent young scientists interested in the field. To address this problem, the Foundation made a grant (described above) to the Cold Spring Harbor Biological Laboratory for a series of summer graduate courses in computational neuroscience. The first of these was run exclusively as a lecture course in 1985. Although the initial version of the course was quite successful, the instructors felt that it would be significantly improved if laboratory exercises could be added to the course involving hands-on access to some of the major computer modelling techniques that now exist in neuroscience. Our grant will permit the course instructors, three of whom are at M.I.T., to develop a full set of computer modelling exercises for the course. The develop-

ment of these exercises will be partially funded by PROJECT ATHENA at M.I.T. and the systems developed will also be used in M.I.T. courses. (Project director: Emilio Bizzi, Director, Whittaker College, M.I.T.)

The Neurosciences Research Foundation **$300,000**
1230 York Avenue (over three years)
New York, New York 10021

The Sloan Foundation recognizes that the success of its initiative in computational neuroscience will require sustained cooperation between two groups of specialists — neuroscientists and computer scientists — who do not normally interact. Accordingly, the Foundation has searched for mechanisms to foster such interaction. The Neurosciences Institute (for which the Neurosciences Research Foundation serves as a funding conduit) is an independent center for advanced study in neuroscience that was created under the auspices of the Neuroscience Research Program at Rockefeller University primarily in order to encourage theoretical work in neuroscience. Our grant will permit the Institute to run a series of summer workshops, each involving some 15 to 25 scientists who will focus for a sustained period on the application of computational theory to a particular problem in neuroscience. The first such workshop was held in 1985 on the rules of synaptic modification that apparently underlie the nervous system's ability to learn new responses to a changing environment. Subsequent topics will be decided by a small planning group working in concert with the Neurosciences Institute staff. (Project director: Gerald M. Edelman, Director, The Neurosciences Institute, and Vincent Astor Professor, Rockefeller University.)

Yale University **$152,500**
New Haven, Connecticut 06520 (over two years)

This grant is not strictly part of the computational neuroscience program, but like an earlier series of grants made in the previous two years, it shares with our computational neuroscience initiative the general aim of fostering the interaction between cognitive science and neuroscience. One of the chief lacunae in neuroscience is the lack of functional understanding of the frontal lobes. The frontal lobes are clearly the principal organs of higher cognition but they have proved difficult to study using traditional techniques. It is therefore particularly important that Patricia Goldman-Rakic, Professor of Neuroscience, and her research team at the Yale Medical School have established an "animal model" of cognition that allows them to localize a particular cognitive activity—the ability to organize goal-directed behavior — in a specific region of the frontal lobes. With Sloan support, Goldman-Rakic's group will be able to undertake a major series of

physiological and anatomical studies in order to work out the functional and physical connections between the frontal lobe center they have localized and other regions of the brain involved in vision, memory, and motor control. The general aim is to discover how a goal is represented in the brain and how the representation is used to organize on-going behavior. This proposal was extensively reviewed by a number of reviewers who considered it an extraordinary scientific opportunity.

Officer Grants in Cognitive Science and Computational Neuroscience

Cold Spring Harbor Laboratory **$20,000**
P. O. Box 100 (over one year)
Cold Spring Harbor, New York 11724

Partial support for a summer course in computational neuroscience. (Project director: Anthony Movshon, Professor of Psychology, New York University.)

Cold Spring Harbor Laboratory **$6,000**
P. O. Box 100 (over one year)
Cold Spring Harbor, New York 11724

Fellowship support for students attending a summer course in computational neuroscience. (Project director: Anthony Movshon, Professor of Psychology, New York University.)

Gordon Research Conference **$10,000**
University of Rhode Island (over one year)
Kingston, Rhode Island 02881

Partial support for a Gordon Research Conference on molecular and cellular aspects of neural plasticity. (Project director: Adrian J. Dunn, Associate Professor of Neuroscience.)

Johns Hopkins University **$30,000**
Baltimore, Maryland 21205 (over one year)

Partial support for a new center of cognitive neuropsychology. (Project director: Alfonso Caramazza, Professor of Psychology.)

Johns Hopkins University — **$20,000**
Baltimore, Maryland 21205 — (over two years)

Computational support for research on neural mechanisms of binocular vision and depth perception. (Project director: Gian F. Poggio, Professor of Neuroscience.)

Marine Biological Laboratory — **$23,000**
Woods Hole, Massachusetts 02543 — (over six months)

Support for a computational neuroscience workshop on spatial relations. (Project director: Terrence J. Sejnowski, Assistant Professor of Biophysics, Johns Hopkins University.)

Princeton University — **$15,000**
Princeton, New Jersey 08544 — (over one year)

For a volume of historical essays concerning the development of modern cognitive psychology. (Project director: William Hirst, Assistant Professor of Psychology.)

Stanford University — **$2,000**
Stanford, California 94305 — (over six months)

For the production and distribution of a report on the current state of cognitive science and its future funding requirements. (Project director: Stanley Peters, Professor of Linguistics.)

United Engineering Trustees, Inc. — **$10,000**
345 East 47th Street — (over one year)
New York, New York 10017

Partial support for a conference on the neural control of movement. (Project director: John M. Hollerbach, Assistant Professor of Psychology, M.I.T.)

University of Alabama — **$10,900**
Birmingham, Alabama 35294 — (over one year)

Support for experiments on the computation of direction in the retina. (Project director: Franklin R. Amthor, Research Assistant Professor.)

University of Arizona — **$14,000**
Tucson, Arizona 85721 — (over one year)

Support for a conference on computational neuroscience. (Project director: Myles Brand, Dean of Faculty of Social and Behavioral Sciences.)

University of Denver — **$22,000**
University Park — (over two years)
Denver, Colorado 80208

Partial support for a Summer Institute on the relation between cognition and emotion. (Project directors: Kurt W. Fisher, and Joseph J. Campos, Professors of Psychology.)

The New Liberal Arts Program

This program, the sixth of the Foundation's "particular programs," moved into its third year of full operation in 1985. The aim of the New Liberal Arts Program is the enrichment of the undergraduate curriculum in quantitative reasoning, in the application of mathematical analysis across many courses and disciplines, and in the teaching of technology and the principles of engineering to liberal arts students.

The program began in the spring of 1982 with small planning grants to 30 independent liberal arts colleges. These grants were followed later that year by major awards of $250,000 to 10 of the colleges, and presidential discretionary grants of $25,000 to the other 20 that had taken part in the first round of competition. Since that time, major grants have gone to a small number of universities, to many of the same 20 colleges that received discretionary grants, and to several historically black institutions. The Foundation's annual reports for 1982-84 describe in detail the activities for those years in the New Liberal Arts Program.

The development of new courses and instructional materials has always been central to the New Liberal Arts Program, but that demanding task had to be preceded in the first year or two by faculty seminars at many of the colleges in the program. Engaging the interest and gaining the commitment of the faculty to the program, and familiarizing the faculty with the substance of the new liberal arts, has been a necessary first step. Having accomplished that assignment, the colleges in 1985 began to give sustained attention to curriculum development, which will continue in the future to be the principal concern of the New Liberal Arts Program.

Our outside advisory committee for this program continued in 1985 to render the same kind of exemplary service, assisting the Foundation's staff with counsel and criticism in all phases of the program, that it has given us from the start. Its members are:

Elting E. Morison, Professor Emeritus, Massachusetts Institute of Technology, chairman of the committee

John G. Kemeny, Professor of Mathematics, Dartmouth College

Nannerl O. Keohane, President, Wellesley College

William Kessen, Professor of Psychology, Yale University

John G. Truxal, Distinguished Teaching Professor of Engineering and Applied Science, State University of New York, Stony Brook

Trustee Grants in the New Liberal Arts Program

Four Renewal Grants to Liberal Arts Colleges

We were aware from the beginning of the New Liberal Arts Program that the curricular reform we were inviting colleges to undertake could not be accomplished in any short period of time; we knew the program could only succeed if the institutions taking part in it had the patience and staying power necessary to effect a permanent and fundamental change in the undergraduate curriculum. That meant the Foundation, too, had to commit itself for the long term and had to be ready to continue its support for some years of the colleges that entered the program, provided they were making good progress.

Of the 10 colleges that won major awards in 1982 in the first round of competition in the New Liberal Arts Program, four came up for renewal consideration in 1985. The Foundation, in cooperation with the presidents of all 10 colleges, stipulated certain conditions for renewals, including a careful evaluation of the first grant and a commitment from the college to match any renewal dollar-for-dollar. The ceiling on renewal grants was to remain the same as the first grant, $250,000. With a one-to-one match, each college receiving a renewal would thus have a substantial fund, $500,000, with which to move ahead at an accelerated pace in phase two of the program.

The following institutions, having met these and other conditions for renewal, received grants of $250,000 in 1985 for expenditure over four or five years:

Carleton College
Northfield, Minnesota 55057
(Project director: Roy O. Elveton, Dean of the College.)

Davidson College
Davidson, North Carolina 28036
(Project director: John P. Brockway, Professor of Psychology.)

Mount Holyoke College
South Hadley, Massachusetts 01075
(Project director: George Cobb, Associate Professor of Mathematics.)

Vassar College
Poughkeepsie, New York 12601
(Project director: Patricia B. Smith, Associate Dean of the College.)

Summer Workshops

The summer workshops we regularly support in the New Liberal Arts Program have been, by common consent and affirmation, one of the most pleasant and successful activities in the program. It is at these workshops that faculty members from liberal arts colleges have an opportunity to work closely with engineering educators who are experienced in the teaching of engineering to liberal arts students, and it is here that they collaborate not only with outstanding engineers but with one another in the development of materials in technology and quantitative reasoning. In reporting on our 1985 grants for workshops, perhaps it is time the Foundation added a note in praise of Professor John G. Truxal, a distinguished engineering educator from the State University of New York, Stony Brook. He has played an indispensable role in conceiving and organizing most of our summer workshops and in carrying a heavy teaching load in them as well. He has been not only an expert leader for our workshops, but a cheerful, patient, and immensely energetic one as well.

Grants were approved by the Trustees in 1985 for six workshops — four that were conducted in the summer of 1985 and two that are to be conducted in the summer of 1986:

Research Foundation of State University of New York — **$497,000**
P. O. Box 9 — (over two years)
Albany, New York 12201

The Foundation supports a Resource Center for the New Liberal Arts Program at the State University of New York, Stony Brook, where it is under the direction of Professor Truxal (identified above). Most of our summer workshops are administered through the Resource Center, although they are conducted on various campuses by various individuals. This grant covered four workshops, for which Professor Truxal was project director, as follows:

1) A workshop on topics in technology conducted at Wellesley College in the summer of 1985 for 26 faculty members from 13 of the colleges active in the New Liberal Arts Program. The grant for this workshop also covered the cost of a two-day meeting, preceding the workshop itself, for Sloan project directors from the 21 institutions that had received major grants in this program ($152,000).

2) A workshop on the technology of medicine and health care conducted at M.I.T. in summer, 1985 under the direction of Ernest G. Cravalho, Professor of Mechanical Engineering in Medicine at M.I.T. ($136,000).

3) A workshop on topics in technology to be conducted at Wellesley College in the summer of 1986, to be followed by a meeting of all the Sloan project directors ($146,000).

4) A workshop to be conducted at Wellesley in summer, 1986 on game theory and national security, under the direction of Steven J. Brams, Professor of Politics at New York University ($63,000).

Harvard University — **$25,000**
Cambridge, Massachusetts 02138 — (over one year)

We supported a small summer workshop at Harvard in 1983 and 1984 in quantitative sociology, attended by professors of sociology from liberal arts colleges. This grant supported a third workshop in 1985. (Project director: James A. Davis, Professor of Sociology.)

Princeton University — **$133,000**
Princeton, New Jersey 08544 — (over one year)

James P. Billington, Professor of Civil Engineering at Princeton, is widely known and highly regarded as an educator with a special interest in the teaching of technology to liberal arts students. With this grant he and his colleagues, Michael S. Mahoney, Robert Mark, and John M. Mulvey, conducted a workshop at Princeton in summer, 1985 for 20 faculty members from colleges in the New Liberal Arts Program. They developed teaching materials on the technology of large-scale engineering works, the development of mass production, and on computer models for making decisions about technology.

Two Grants for Phase One Colleges

Amherst College — **$150,000**
Amherst, Massachusetts 01002 — (over three years)

Swarthmore College — **$150,000**
Swarthmore, Pennsylvania 19081 — (over three years)

In 1984 the Foundation made grants of $150,000 to seven of the 20 colleges that had received small presidential awards in the first round of competition in the New Liberal Arts Program. Our purpose in making these grants was to be of some continuing help to the colleges that had joined us in the beginning of the program and to keep them as engaged as possible in the new liberal arts. In 1985 we added two more colleges, Amherst and Swarthmore, to the seven from last

year; thus the Foundation has now made major grants to nearly half the colleges that received the smaller grants in the first round. Amherst will develop several new lower-division courses in quantitative reasoning in the social sciences together with a series of junior-level colloquia on quantitative methods in the humanities and social sciences. Swarthmore, one of the few colleges in the New Liberal Arts Program with an engineering department, will take advantage of that fact and develop a series of courses in technology for non-engineering students. (Project director at Amherst: Richard D. Fink, Dean of the Faculty; and at Swarthmore: codirectors Alfred H. Bloom, Associate Provost; T. Kaori Kitao, Professor of Art; and Nelson A. Macken, Professor of Engineering.)

A Resource Center for the Program

Research Foundation of the State University of New York — **$806,000**
P. O. Box 9 — (over three years)
Albany, New York 12201

From the beginning of the New Liberal Arts Program, the Foundation assumed that a resource center of some kind would be needed as the program developed. The time seemed right this year for us to put such a center in place: over 50 colleges and universities are now active in the program; many more are interested in it and trying to follow its progress; professional associations have begun to devote part or all of their meetings to the program; inquiries about the program come to the Foundation with great frequency from across the country; educational journalists write frequently about it; and other private foundations, as well as corporate and government foundations, follow the program. In brief, the need for a central source of information about the program was clear by 1985. Accordingly, the Trustees made two grants last year, totaling $806,000, to meet the costs for three years of the Resource Center for the New Liberal Arts Program, located at the State University of New York, Stony Brook.

The Center carries out many functions essential to the New Liberal Arts Program, among them: organization and supervision of summer workshops; publication of a newsletter devoted to the New Liberal Arts Program; publication and dissemination of teaching modules and other materials developed at the colleges and universities taking part in the program; administration of a faculty leave program for institutions active in the program; maintenance of a speakers' and visitors' service; and negotiation on behalf of groups of institutions in the program with vendors of computer equipment for gifts or discounted hardware. The Center is under the supervision of Professor John G. Truxal and is governed by a steering committee of six persons, four of whom come from the colleges of the New Liberal Arts Program.

Other Trustee Grants in the New Liberal Arts Program

Brown University — **$30,000**
Providence, Rhode Island 02912 — (over one year)

A group of institutions called the Council for the Understanding of Technology in Human Affairs began the publication several years ago of a journal, *The Weaver*, devoted to the subject of technology as a liberal study. The journal is edited and distributed by Barrett Hazeltine, Professor of Engineering at Brown, on behalf of CUTHA. Because *The Weaver* is closely related to the New Liberal Arts Program and counts among its contributors a large number of engineering educators who have leading roles in our program, the Foundation has helped finance *The Weaver* since 1983. This renewal grant will meet its costs in 1986.

Georgia Institute of Technology — **$245,000**
Atlanta, Georgia 30332 — (over one year)

This is the third grant the Foundation has made in support of a consortium of historically black colleges known as Resourceful Exchange: Technology and the Liberal Arts (RETLA). Georgia Tech has been the organizational center for RETLA. In collaboration with the 20 black institutions that make up the consortium, it has conducted a program over the last three years of workshops in technology, computing, and applied mathematics for faculty members from these institutions. This grant will meet the costs of the RETLA consortium through June 1986. (Project directors: Melvin Kranzberg, Professor of History; Paul G. Mayer, Professor of Civil Engineering; A. D. Van Nostrand, Professor of English; and Donovan B. Young, Professor of Industrial and Systems Engineering — all of Georgia Tech. All activities of the consortium are under the supervision of the RETLA advisory board, chaired by Professor Van Nostrand.)

Iona College — **$50,000**
New Rochelle, New York 10801 — (over two years)

This liberal arts college is one of the few institutions in the United States that requires the study of technology by all its students. The president of Iona, John Driscoll, a physicist, has given strong leadership to the faculty in the development of instructional materials over the last five years in technology, science, computing, and applied mathematics. Although the Foundation is not yet able to expand the New Liberal Arts Program beyond the group of institutions with which we began, we felt the extraordinary commitment of this institution to the new liberal arts more than justified an exception. This grant will help the College

continue the development of teaching materials in technology and applied mathematics for liberal arts students. (Project director: James J. Murphy, Director of Science and Technology.)

Massachusetts Institute of Technology **$30,000**
Cambridge, Massachusetts 02139 (over two years)

Leon Trilling, Professor of Aeronautics and Astronautics at M.I.T., has been a key figure in the New Liberal Arts Program over the last three years. He has taught in our summer workshops, developed materials of his own for the teaching of technology to non-engineering students, and has been of great help to faculty members from the colleges in the program who wish to work in an M.I.T. laboratory. This grant will help him continue these activities over the next two years.

Research Foundation of the State University of New York **$160,000**
P. O. Box 9 (over one year)
Albany, New York 12201

One of the most attractive elements of the New Liberal Arts Program for college faculty members is the special leave project, through which a small number of faculty members are supported to spend a year in a university laboratory working in the new liberal arts. The Foundation is supporting four such individuals in the 1985-86 academic year at a cost of $80,000. On the advice of the steering committee for the Stony Brook Resource Center, which administers this project, we doubled the number of such awards for the 1986-87 year and stressed support of curriculum development in the eight awards made possible by this grant.

Syracuse University **$150,000**
Syracuse, New York 13210 (over three years)

Syracuse was one of three universities to which the Foundation made grants in 1981 (before the official start of the New Liberal Arts Program) for work in what we were then calling "technological literacy." The University wished to treat the study of technology as an integral part of its offerings in science and in the social dimensions of science; and our first grant helped meet the costs of curriculum development in a three-level system of courses. The job is turning out to be harder than the University thought, a frequent experience in the New Liberal

Arts Program, but progress is being made and obstacles overcome. Syracuse has revised its plan in only minor ways and is confident of success. This renewal grant for continued development of the curriculum will be matched one-for-one by the University. (Project director: Gershon Vincow, Dean of the College of Arts and Sciences.)

University of Chicago **$280,000**
Chicago, Illinois 60637 (over three years)

The New Liberal Arts Program is still a program for independent liberal arts colleges. Most of the grants we have made to universities have gone to engineers to help them develop materials in technology the colleges can use. In 1984, however, we made a grant to Stanford University to allow a team of four faculty members, only one of whom was an engineer (the others represent physics, chemistry, and mathematics), to develop a course that explores the nature of problems in each discipline and illuminates the ways in which the four fields interact. In 1985, we made another "non-engineering" university grant, this time to allow three faculty members at the University of Chicago (a computer scientist, a statistician, and a mathematician) to develop a new year-long course that will integrate mathematics, data analysis, and computer programming. They will collaborate in this project with faculty members from colleges in the New Liberal Arts Program, who will use the materials on their own campuses. (Project director: David W. Oxtoby, Master, Physical Sciences, The College.)

Officer Grants in the New Liberal Arts Program

University of Southern California **$20,000**
Los Angeles, California 90089 (over one year)

For the planning phase of a project to develop teaching materials in technology for non-engineering students. (Project director: Gerald Nadler, Professor of Industrial and Systems Engineering.)

Virginia Polytechnic Institute and State University **$10,000**
Blacksburg, Virginia 24061 (over one year)

For the planning phase of a project to develop teaching materials in technology for non-engineering students. (Project director: Paul E. Torgersen, Dean of the College of Engineering.)

Economics

The Foundation's activities in economics were substantial in 1985, as they have been for some years. In addition to the awards made to economists in our two fellowship programs, we maintained a program of grants principally in support of economics research. Our grants in this field last year included two sets of coherent grants, one of which reflects our successful experience in doctoral workshops and one of which takes the Foundation into a new area of interdisciplinary research.

Economics Workshops

$1,275,000 over three years

From 1977 to 1984 the Foundation supported graduate-level workshops in microeconomics research at a large number of leading economics departments. Two rounds of competition were held during those years and 22 grants made to stimulate new work in microeconomics and to train doctoral candidates in the methods of microeconomics research. These grants are reviewed in detail in our previous annual reports, available free on request.

As the second round of grants was coming to an end in 1984, we asked Paul Joskow, Professor of Economics at M.I.T., to do an evaluation of the program. He found the program highly successful, as evidenced, among other things, by the rich stream of dissertations and scholarly papers produced. He also found the doctoral-candidate workshop, led by senior professors, a singularly effective mode of operation for our purposes and recommended that it be retained if the Foundation continued its activities in economics research.

We were happy to follow Professor Joskow's recommendation. In 1985 we organized, with the help of an outside advisory committee of economists, a third round of competition among economics departments, but with a change in emphasis from microeconomics to macroeconomics. The general theme developed by the advisory committee was the increased openness of the American economy and the significance of this fact for our understanding of the internal behavior of the economy and the role of our economy in the world. The committee identified such topics as the following as appropriate for applicants: open-economy macroeconomics; international financial markets; comparative analysis of institutions across countries; the nature of trade in the modern world; reconsideration of traditional policy analysis in a more open economy; and demography and immigration. Twenty-five departments of economics were invited to submit proposals either in 1985 or 1986; 16 submitted proposals last year and five were awarded grants of $255,000 for workshops over three years, as follows:

Columbia University
New York, New York 10027
(Project director: Ronald Findlay,
Professor of Economics.)

Massachusetts Institute of Technology
Cambridge, Massachusetts 02139
(Project director: E. Carey Brown,
Professor of Economics.)

Princeton University
Princeton, New Jersey 08544
(Project director: Peter Kenen,
Professor of Economics.)

University of Minnesota
Minneapolis, Minnesota 55455
(Project director: Thomas J. Sargent,
Professor of Economics.)

University of Wisconsin
Madison, Wisconsin 53706
(Project directors: Mark Gertler and Kenneth
Rogoff, Professors of Economics.)

Behavioral Economics

Late in 1984, the Trustees approved an internal appropriation of $250,000 for an exploratory program in the newly developing area of behavioral economics. The central premise underlying this nascent field is the belief that traditional economic analysis can be significantly enriched by making use of the results and techniques of the neighboring behavioral and social sciences.

Modern economics employs a highly simplified set of assumptions about the nature of human rationality and human motivation. Although these assumptions have proved reasonably effective and have supported what is arguably the most successful of the social sciences, there are clearly many areas where both the coverage and the empirical accuracy of economic theory might be improved. The behavioral approach suggests that this improvement might be achieved by incorporating more empirically accurate assumptions about individual human behavior and about social processes into economic models and theories.

In 1985 an advisory committee was established to guide the Foundation's exploration of this new area. The members of this committee included economists William J. Baumol of Princeton and Thomas C. Schelling of Harvard and psychologists Robert Abelson of Yale and Leon Festinger of The New School for Social Research. The advisory committee held a series of seminars attended jointly by economists and other behavioral scientists in order to examine the usefulness of behavioral approaches to particular economic questions, such as the performance of financial markets or the explanation of savings behavior. The advisory committee also recommended a small set of exploratory grants for behavioral economic research projects of particular promise, which the Foundation made in 1985.

Although the Foundation's initiative in behavioral economics is still provisional, the Trustees, on the recommendation of the advisory committee, have approved a limited invitation program in behavioral economics for 1986. Small grants of up to $50,000 will be available for efforts to develop and test behavioral models, for observational studies of economic decision making in real settings, and for experiments with simulated markets designed to examine the market consequences of psychological and social processes. Four exploratory grants were made from this appropriation in 1985:

Cornell University **$30,000**
Ithaca, New York 14853 (over one year)

For research on the conception of fairness and its effects on the responsiveness of prices. (Project director: Richard H. Thaler, Professor of Economics.)

University of California, Santa Barbara **$6,000**
Santa Barbara, California 93106 (over one year)

Partial support for a conference on instabilities of individual preference. (Project director: David Messick, Professor of Psychology.)

University of Chicago **$26,000**
Chicago, Illinois 60637 (over one year)

For a series of experiments testing a theory of inter-temporal choice. (Project director: George Loewenstein, Assistant Professor of Behavioral Sciences.)

University of Pennsylvania **$35,000**
Philadelphia, Pennsylvania 19104 (over one year)

For a series of experiments on individual decision making in experimental insurance markets. (Project director: Howard Kunreuther, Professor of Decision Science.)

Other Trustee Grants in Economics

Brookings Institution **$150,000**
1775 Massachusetts Avenue, N. W. (over three years)
Washington, D. C. 20036

In collaboration with the Centre for Economic Policy Research in London, the Brookings Institution began a research project last year on macroeconomic interactions among the major western economies. Among the topics to be studied are: empirical modeling of macroeconomic interactions; regional monetary and trading agreements, with emphasis on the European Monetary System; the functioning of markets, with emphasis on the international financial aspects of the topic; decentralized market arrangements and their contribution to the management of interdependence; strategic interactions among national governments under non-cooperative and cooperative decision making; and the potential gains and costs of expanded efforts by national governments to coordinate their decisions about macroeconomic policies. Brookings and CEPR have each enlisted a large number of respected economists to participate in the project. The Sloan grant will meet about a third of the costs over three years. (Project director: Ralph Bryant, Senior Fellow at Brookings.)

Institute for International Economics **$300,000**
11 Dupont Circle (over three years)
Washington, D. C. 20036

This organization was brought into being in 1981 through the auspices of the German Marshall Fund as the only major research center in the United States devoted solely to international economic issues. These issues — for example, the trade deficit, the exchange rate of the dollar, the threat of protectionism, the debt problem of developing countries, and the macroeconomic policies of the United States and other countries — are of fundamental importance to the American economy. The Institute conducts studies of recognized excellence in all these areas and more. Its work is aimed at senior government officials and corporate executives and offers them analyses of the macroeconomic problems they are likely to face in the near future. The Institute has developed a long-range plan for putting itself on a permanent financial footing and in 1985 asked the Sloan Foundation for a general-support grant as a part of this plan. The Foundation does not normally make such grants but we felt, given the outstanding record of the Institute, that an exception in its case was warranted. Our grant will meet about five percent of the Institute's budget for three years. (Project director: C. Fred Bergsten, Director.)

University of Michigan **$133,000**
Ann Arbor, Michigan 48106 (over one year)

The Panel Study of Income Dynamics (PSID) at the University of Michigan has collected longitudinal data each year since 1968 on a sample of 5,000 families, on such economic variables as income, employment, child care, and family composition. Economists agree that this kind of data can provide important insights not obtainable from cross-sectional census or survey data. The Foundation supported part of the PSID budget for the years 1981-84. Several European countries have now begun to emulate PSID with their own longitudinal studies. The national data sets being produced would be strengthened and made more usable if standards of data collection and coding could be established. PSID has designed a five-year project to develop such standards in collaboration with European countries. Our grant will support the start-up year, after which financing is expected from the national science foundations of the countries involved. (Project director: Greg J. Duncan, Associate Research Scientist, Survey Research Center at the University of Michigan.)

Officer Grants in Economics

American Council on Education **$15,000**
One Dupont Circle (over one year)
Washington, D. C. 20036

Support for a meeting of the Business-Higher Education Forum on the subject of American competitiveness in international markets. (Project director: Robert H. Atwell, President of ACE.)

Centre for Economic Policy Research **$30,000**
6 Duke of York Street (over two years)
London SW1Y 6LA, England

For part of the production costs of the journal, *Economic Policy Research*. (Project director: Richard Portes, Director.)

Colorado School of Mines **$5,000**
Golden, Colorado 80401 (over one year)

For the development of leading economic indicators for the mineral, oil, and gas industries. (Project directors: Thomas D. Kaufman, Professor of Mineral Economics; and Ruth A. Maurer, Associate Professor of Mineral Economics.)

Committee for Economic Development **$10,000**
477 Madison Avenue (over one year)
New York, New York 10022

To supplement a grant the Foundation made in 1983 for a study of basic issues in tax reform. (Project director: David Bradford, Professor of Economics at Princeton University.)

Harvard University **$25,000**
Cambridge, Massachusetts 02138 (over one year)

For a conference on the cigarette excise tax. (Project director: Thomas C. Schelling, Director of the Institute for the Study of Smoking Behavior and Policy.)

Princeton University **$14,400**
Princeton, New Jersey 08544 (over one year)

For a study of rational behavior and market efficiency. (Project director: Richard E. Quandt, Professor of Economics.)

United Nations Association of the USA **$30,000**
300 East 42nd Street (over one year)
New York, New York 10017

Partial support for an Economic Policy Council Panel on U. S. Policy Toward the Emerging Industrial Countries. (Project directors: Robert Hormats and Walter Wriston.)

University of Maryland **$20,000**
College Park, Maryland 20742 (over one year)

For a bilateral study of time use in the United States and the Soviet Union. (Project director: John P. Robinson, Director of the Survey Research Center.)

University of Michigan **$10,000**
Ann Arbor, Michigan 48106 (over one year)

For a research workshop on the Survey of Income and Program Participation. (Project director: Jerome M. Clubb, Executive Director of the Inter-University Consortium for Political and Social Research.)

University of Pennsylvania **$24,000**
Philadelphia, Pennsylvania 19104 (over one year)

For a conference entitled "Privatization of the Public Sector." (Project director: Jeffrey A. Sheehan, Associate Dean of the Wharton School.)

Williams College **$10,000**
Williamstown, Massachusetts 01267 (over one year)

For a conference on development policy and economics training. (Project director: Henry J. Bruton, Chairman of the Center for Development Economics.)

Education and Research in Public Management

Education and research in the management of government—a field also known as public policy, public management, or education for the public service—has been a major interest of the Foundation since 1976. Most of the grants we made in the early years helped establish new degree programs at the graduate level and new course sequences at the undergraduate level. By 1981 we felt that an adequate number and variety of new programs and experimental curricula had been developed; and it was clear by then that the public management program on many campuses had become firmly established and stable. We turned our attention in 1981 to two complementary kinds of activity in public management: research and minorities. It seemed to us and to leaders in the field of public management that the most pressing needs were the development of a strong base of research upon which the instructional program could stand, and the creation of a systematic effort to increase the flow of minority students into the rigorous, high-quality courses of study the Sloan grants had helped establish.

Most of the Foundation's grants in this field for the last five years have therefore been aimed at these twin goals, with a steadily increasing portion of funds going to the minorities part of the program. So substantial had the minorities project become by 1984 that it had taken on all the characteristics of a "particular program" (see the front matter of this report for a description of our particular programs). Thus it became the first of our seven particular programs to have achieved that status through a process of evolutionary growth; the other six started life as particular programs. We were again assisted in 1985 in the public management program, as we have been in previous years, by the Association for Public Policy Analysis and Management (APPAM), an organization of leading individuals and institutions in the field.

Particular Program for Minorities in Public Management

Trustee Grants
$2,294,000

Eight APPAM Post-Junior Year Summer Institutes **$750,000**
(over one year)

Two APPAM Post-Senior Year Summer Institutes **$344,000**
(over one year)

In 1985 the Foundation provided its sixth year of support for these institutes, jointly developed by APPAM and the Foundation. The ultimate goal of the institutes, as is that of our particular program, is to increase the number of minorities in positions of authority in government, especially state and local government. To facilitate the flow of promising minority students into new degree programs in public management, APPAM gives them special academic support and counseling as undergraduates. This support is offered through an intensive eight-week summer residential institute where instruction is concentrated on economics, statistics, computing, and communication skills. The student attends the institute between his junior and senior college years, and may attend another, higher-level institute in the summer after his undergraduate degree and before enrolling in an APPAM graduate school. The Foundation's grant in 1985 financed post-junior-year institutes, each at $90,000 for 28 students, at the following APPAM schools:

Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213
(Project director: Brian J. L. Berry, Dean of the School of Urban and Public Affairs.)

Princeton University
Princeton, New Jersey 08544
(Project director: T. James Trussell, Professor of Economics and Public Affairs.)

State University of New York, Stony Brook
Stony Brook, New York 11794
(Project director: Thomas Sexton, Professor of Policy Analysis and Public Management.)

University of California, Berkeley
Berkeley, California 94720
(Project director: Phyllis Green, Associate Dean of the Graduate School of Public Policy.)

University of Michigan
Ann Arbor, Michigan 48109
(Project director: Paul N. Courant, Director of the Institute of Public Policy Studies.)

University of Minnesota
Minneapolis, Minnesota 55455
(Project director: John Brandl, Professor of Public Affairs and Planning.)

University of Texas, Austin
Austin, Texas 78712
(Project director: Max Sherman, Dean of the Lyndon B. Johnson School of Public Affairs.)

University of Washington
Seattle, Washington 98195
(Project director: Hubert Locke, Dean of the Graduate School of Public Affairs.)

A second major element in our particular program for minorities is the post-senior-year summer institutes we have supported since 1981. These advanced institutes are restricted to students of high promise who have successfully completed one of the post-junior-year institutes and who have been accepted by an APPAM school for enrollment in a graduate program the following fall. The subjects are again economics, statistics, computing, and communication skills taught at an advanced level. APPAM students now in graduate school continue to give high ratings to the summer institutes they attended, crediting the institutes with making it possible for them to compete in high-quality graduate programs. The two post-senior-year institutes in 1985 were conducted, as they were in previous years, at Harvard where 55 students attended at a cost of $240,000, and at the Rand Corporation where 20 attended at a cost of $104,000:

Harvard University
Cambridge, Massachusetts 02138
(Project director: Ronald F. Ferguson, Director of the APPAM Summer Program, John F. Kennedy School of Government.)

Rand Corporation
1700 Main Street
Santa Monica, California 90406
(Project director: Charles Wolf, Jr., Dean of the Rand Graduate Institute.)

Duke University — **$1,200,000** (over one year)
Durham, North Carolina 27706

The third and final element in our particular program for minorities in public management is fellowship support for those students who successfully complete one of the post-senior-year institutes and enroll in an APPAM graduate program. The Foundation meets the cost of their first year of graduate school, after which

they are expected to finance their second year in the same manner as do other students at the institutions they are attending. The Foundation's expenditures in this part of our minorities program have risen each year in response to the increasing number of students who are qualifying for the fellowships. The 1985 grant supported 87 students who were enrolled in 15 APPAM graduate programs. The grant last year was administered by Duke University on behalf of the APPAM schools. (Project director: Robert Behn, Director of the Institute of Policy Sciences and Public Affairs.)

Other Trustee Grants in Public Management

American Arbitration Association — **$170,000**
140 West 51st Street — (over two years)
New York, New York 10020

The social security disability system of the United States has been the object of many studies over the years. It is by common consent a cumbersome system that is plagued by problems and serves no one well. Eligibility rules are confused; procedures are sluggish and weighted down by appeals; jurisdiction between the states and the federal government is tangled and competitive rather than coordinated; the Social Security Administration is so burdened with its load of applications and related paperwork that fair and efficient administration is not possible; and the federal court system is clogged with an estimated 40,000 disability cases. Marvin Schwartz is a retired administrative law judge with many years of experience with the social security system. He believes the system can be reformed to the great benefit of all concerned. This grant will allow him to do a thorough study of the system and prepare a report that should advance public and professional understanding of a greatly confused field of law and public management.

National Conference on Social Welfare — **$75,000**
1730 M Street, N. W. — (over one year)
Washington, D. C. 20036

The Foundation made a grant of $200,000 in 1984 to this organization to help finance its Project on Federalism and National Purpose. The primary concern of the Project is with a particularly complex problem of public management: the relative efficiency of public and private services and the most appropriate level of government — federal, state, or local — for the carrying out of various programs and responsibilities. Active in the Project are a number of outstanding scholars and elected officials, who are giving special attention to the problems

of intergovernmental relations; to the stresses likely to be created at different levels of government by such national problems as aging and long-term unemployment; and to other problems associated with the "new federalism." This renewal grant will help bring the project to the stage of publication. (Project director: Alan Pifer, President Emeritus of the Carnegie Corporation.)

Princeton University — **$300,000**
Princeton, New Jersey 08544 — (over three years)

We made a grant of $300,000 to Princeton in 1982 to allow the Woodrow Wilson School of Public and International Affairs to establish an instructional program in public policy as it is affected by developments in science and technology. In the past most of the students in the Woodrow Wilson School came from the social sciences, but the Sloan grant stimulated a substantial number of Princeton students in science and engineering to seek affiliation with the School and led the School to add a physicist to its senior faculty. This renewal grant will support a continued program of curriculum development and related activities. (Project director: Donald E. Stokes, Dean of the School.)

Smith College — **$106,000**
Northampton, Massachusetts 01063 — (over two years)

Smith is one of the independent colleges that received an initial Sloan grant ($240,000 in 1981) for the establishment of a sequence of courses — a "concentration," not a major — in public policy. The faculty is making good progress in developing that curriculum; and the program in public policy that is emerging has been approved as an inter-disciplinary minor. This renewal grant will allow the faculty to complete the basic course sequence. (Project director: Randall Bartlett, Director of the Program in Public Policy.)

Officer Grants in Public Management

Association of Governing Boards of Universities and Colleges — **$25,000**
One Dupont Circle — (over one year)
Washington, D. C. 20036

For seminars on issues of public policy, to be carried out in collaboration with the Brookings Institution. (Project director: Robert L. Gale, President of the Association.)

Association for Public Policy Analysis and Management — **$18,000**
Durham, North Carolina 27706 — (over one year)

For a conference on the curriculum in policy analysis and public management. (Project director: Donald E. Stokes, President of APPAM.)

Kenyon College — **$12,000**
Gambier, Ohio 43022 — (over one year)

For conferences on public policy and other activities of the Public Affairs Conference Center. (Project director: Philip H. Jordan, Jr., President.)

National Conference on Social Welfare — **$20,000**
1730 M Street, N. W.
Washington, D. C. 20036 — (over one year)

For the printing and dissemination of a report by the Committee on Federalism and National Purpose. (Project director: Alan Pifer, President Emeritus of the Carnegie Corporation.)

Other Grants and Activities

In this section we review grants and activities that are related to the main interests of the Foundation but that stand apart from a specific program or from our support of work in particular academic fields.

Trustee Grants in Arms Control and Defense Policy

Although the Foundation does not have an organized program in arms control and defense policy, our support of research and teaching in this field increased last year, stimulated by small exploratory grants made in previous years. Because a number of other foundations are also active in this field, some with major programs, we believe Sloan's role should continue to be carefully limited and defined.

Three workshops for college teachers

Massachusetts Institute of Technology — **$179,000**
Cambridge, Massachusetts 02139 — (over one year)

University of California, San Diego — **$96,000**
La Jolla, California 92093 — (over one year)

In response to the heightened concern of students and the general public with arms control and nuclear weapons, colleges and universities have been developing new courses and seminars in the last few years on nuclear issues and defense policy. Most of the newer instructional programs are led by faculty members who have had little opportunity themselves to master this difficult and complex subject, and who are anxious to deepen their understanding of the technology of nuclear weapons and the history of arms control. This year's grant to M.I.T. was the third we have made to that institution for the support of summer workshops on nuclear weapons and arms control attended by faculty members from colleges and universities. These two-week workshops are conducted jointly by individuals from the Arms Control and Defense Policy Program at M.I.T. and from the Center for Science and International Affairs at Harvard. Evaluations of the workshops are done each year and testify forcefully to the effectiveness of these short summer courses. (Project director: Jack Ruina, Professor of Electrical Engineering and Computer Science at M.I.T.)

For the last two summers, the Foundation has also supported a workshop on the West Coast similar to that in Cambridge. This workshop draws its participants from the western states and, like its twin in Cambridge, is concerned mainly with the improvement of undergraduate instruction. (Project director: Herbert F. York, Director of the Institute on Global Conflict and Cooperation, University of California, San Diego.)

University of Miami — **$75,000**
Coral Gables, Florida 33124 — (over one year)

Few faculty members from the southern states attend the summer workshops in Cambridge or on the West Coast. This grant will allow the University of Miami to offer southern institutions a similar workshop during the winter of 1985-86. It will be taught mostly by experienced faculty members from the Cambridge and West Coast workshops. (Project director: Beham N. Kursunoglu, Director of the Center for Theoretical Studies at the University of Miami.)

Other Trustee Grants in Arms Control and Defense Policy

Harvard University — **$123,600**
Cambridge, Massachusetts 02138 — (over two years)

The need to train a new generation of specialists in arms control drawn from the physical sciences is a widely recognized one. It is the primary mission of the Center for Science and International Affairs at Harvard. Graduate students and post-doctoral fellows spend one or two years at the Center in teaching, research, and participation in seminars and other collaborative activities, after which they embark on careers in government or academia. Over the last 10 years, the Center has trained 114 such persons, most of whom are now engaged in work related to arms control and defense policy. This grant will support three post-doctoral fellows a year for two years. (Project director: Paul Doty, Director of the Center.)

University of California, San Diego — **$115,000**
La Jolla, California 92093 — (over one year)

The Institute on Global Conflict and Cooperation at UCSD, like the Harvard Center for Science and International Affairs, is concerned with the shortage of younger scholars specializing in arms control, particularly in the technology of nuclear weapons. Graduate students are often reluctant to pursue their interest

in arms control for fear that such research will not be recognized as central to their academic field. This grant will support four graduate students for two years each and insure that their research meets the dissertation requirements of their graduate departments while also contributing to the research program of the Institute. (Project director: Herbert F. York, Director of the Institute.)

WGBH Educational Foundation — **$500,000**
125 Western Avenue — (over two years)
Boston, Massachusetts 02134

The Foundation made a planning grant of $131,000 in 1983 to allow WGBH, the public television station in Boston, to collaborate with M.I.T. and other institutions in the development of a televison-based course of instruction on nuclear weapons and defense policy. Two years were needed to perfect this ambitious plan and secure financing for the main project — $6.5 million that was raised from the Annenberg/CPB Project and a number of foundations. Entitled "The Nuclear Age," this instructional program will consist of 13 hours of television, a series of video cassettes for use in classrooms, and printed materials of several kinds. It is not intended to advance a particular point of view about highly controversial matters, but to provide a foundation of historical and technical knowledge from which viewers can form their own judgments about the nuclear dilemma. Working with the production team at WGBH will be leading members of the defense policy and national security groups at Harvard and M.I.T. (Project director: Peter S. McGhee, Program Manager for National Production at WGBH.)

Officer Grants in Arms Control and Defense Policy

American Academy of Arts and Sciences — **$17,850**
Norton's Woods, 136 Irving Street — (over two years)
Cambridge, Massachusetts 02138

For participation by AAAS in a European conference on new developments in strategic defenses and space weapons. (Project director: John Holdren, Chairman, U.S. Pugwash Committee.)

Brookings Institution — **$20,000**
1775 Massachusetts Avenue, N. W. — (over one year)
Washington, D. C. 20036

For a series of seminars on nuclear weapons, manufacturing quality, and the weapons acquisition process. (Project director: A. Lee Fritschler, Director, Center for Public Policy Education.)

Educational Foundation for Nuclear Science
5801 South Kenwood Avenue
Chicago, Illinois 60637

$19,128
(over one year)

For preparation of the 40th anniversary issue of the *Bulletin of the Atomic Scientists*. (Project director: Len Ackland, Editor of the *Bulletin*.)

University of California, Los Angeles
Los Angeles, California 90024

$29,300
(over one year)

For a conference entitled, "The Calculus of Terror: Nuclear Weapons and Its Discontents," sponsored by the Center for International and Strategic Affairs. (Project director: Roman Kolkowicz, Professor of Political Science.)

Other Trustee Grants for Miscellaneous Purposes

American Committee on East-West Accord
109 Eleventh Street, S. W.
Washington, D. C. 20003

$100,000
(over two years)

The purpose of this nonpartisan, educational organization is the improvement of East-West relations, with emphasis on American-Soviet relations. One of its major projects, "American Specialists on the Soviet Union," began in 1984. Through this project, American public officials, in their efforts to develop a coherent national policy toward the Soviet Union, have access to leading American specialists on the Soviet Union from many fields, including economics, political science, national security, and human rights. The Committee brings experts together to meet first among themselves, and then with high-level policy representatives from Congress and many of the Executive departments. (Project director: Roland S. Homet, Jr., Director of the American Specialists on the Soviet Union.)

Dartmouth College
Hanover, New Hampshire 03755

$67,000
(over two years)

The Foundation made a grant of $200,000 to Dartmouth in 1981, part of which supported the development of a "pre-mastering" videodisc facility for faculty members from Dartmouth and other institutions in the northeast. In the opinion

of many educators, the technology of the videodisc, especially when combined with the microcomputer, holds great promise for instruction. These complex systems require special facilities and technical assistance for faculty members wanting to experiment with them and wanting to learn how to prepare an educational videodisc for mastering. This renewal grant will support the project through its final stage. (Project director: William M. Smith, Director of the Office of Instructional Services and Educational Research.)

East-West Center
1777 East-West Road
Honolulu, Hawaii 96848

$112,700
(over two years)

Research on immigration to the United States has tended to focus upon Latin American migration, but in recent years the largest source of legal immigration has shifted to Asia. This project's focus on Asian migration therefore may help to correct an imbalance of research attention. Asian migration, which includes relatively significant numbers of professionals such as engineers and nurses, is also of special interest in terms of U.S. labor markets, since much higher levels of human capital are involved than from most of Latin America. The East-West Center project also involves several important methodological innovations. The data on immigrants will be obtained shortly before they move to the U.S., rather than at varying periods after their arrival. This approach may provide better coverage of immigrant groups, and also allow wholly new information to be collected on labor force expectations, prospective future immigration by family members, detailed work history and educational information, initial language ability, pre-arranged job and housing arrangements, and funds available for investment in the U.S. The study design also allows for longitudinal follow-up of immigrant "cohorts" over time. (Project director: James T. Fawcett, Research Associate.)

Fund for the City of New York
419 Park Avenue
New York, New York 10016

$150,000
(over five years)

Since 1973 the Fund for the City of New York, a non-profit organization that works with many government agencies in the city, has sponsored a program of cash awards of $5,000 to municipal employees who have given extraordinary service over a long period of time. To date 89 employees from all ranks and levels of city government have received these coveted awards. The criteria for selection include evidence that the individual has regularly turned in a superior

performance, has been willing to risk reputation and the chances of promotion when it was necessary to improve services or correct abuses, has found methods of reducing governmental red tape and making government more responsive to the citizens' needs, and has been consistently outstanding whether in the daily routine or in crisis situations. These awards are given as a celebration each year, and the publicity attending them calls to the attention of both the public and the city's employees the fact that government can be efficient and humane. This grant, one of the Foundation's "civic grants," complements the program we have conducted for many years to improve the management of government and will finance the awards for five years. (Project director: Gregory Farrell, Director of the Fund.)

National Academy of Sciences **$250,000**
2101 Constitution Avenue (over three years)
Washington, D. C. 20418

In 1984 the Academy established a Committee on the Status of Black Americans, whose purpose is to marshal and synthesize evidence from many different sources on the changes that have come about in the status of black Americans since World War II. Significant changes have obviously occurred in government policies, in the legal status of black Americans, and in the interactions of government with the private sector. Major changes in racial attitudes have taken place as well. What is less clear is whether these changes have led to equally significant improvements in the economic and educational status of American blacks. The classic study of these issues was published in 1944 by Gunnar Myrdal; now the Academy, with the help of this grant, will undertake a comprehensive analysis of the same issues after 40 years of dramatic change.

Princeton University **$100,000**
Princeton, New Jersey 08544 (over two years)

R. Manning Brown, Jr., served with distinction on the Sloan Foundation's Board of Trustees for 15 years, during which time he demonstrated on many occasions his deep interest in undergraduate education. He also served as a Trustee of Princeton University for 22 years and as Chairman of its Executive Committee for 13 of those years. After his death in October, 1985, the university established a scholarship fund in his name, reflecting his interest in the maintenance of a strong financial aid program, a program from which he himself had benefited as a student at Princeton. This grant is the Foundation's contribution to the R. Manning Brown, Jr., Scholarship Fund. (Project director: William G. Bowen, President.)

Tufts University **$200,000**
Medford, Massachusetts 02155 (over two years)

Many grants from government agencies and private foundations over many years have gone for the support of experiments in the use of computers in education. To say that the results have been disappointing is only to say the obvious; but both foundations and those they fund, persuaded of the enormous potential of computer-based instruction, persevere in the quest for better and more creative applications. Professors Daniel C. Dennett and George Edwin Smith of the Tufts Department of Philosophy are trying to develop software they describe as "imagination magnifiers"; that is, user-controlled graphics systems that permit the student to see in detail the operation of complex phenomena that are not easily understood by other means. The internal operations, for example, of a computer itself are sufficiently fast, complicated, and inaccessible to baffle many students. If these operations are selectively enlarged, slowed down, and simplified in a working computer graphics simulation that the student can program himself — one of the experimental programs of Professors Dennett and Smith — even students with limited technical background can gain a good understanding of how a computer works. This grant will allow Professors Dennett and Smith to establish a software facility that will produce more imagination magnifiers from such fields as population genetics, micro-biology, neuroscience, and economics.

Vanderbilt University **$135,000**
Nashville, Tennessee 37212 (over one year)

The Foundation has supported since 1980 a monumental study of the presidential selection process of the United States. The study is under the direction of Alexander Heard, Chancellor Emeritus of Vanderbilt University. Our grant in 1985 was the last installment of the Foundation's commitment to this study that is due for publication in 1986 or 1987.

Officer Grants for Miscellaneous Purposes

Association of Colleges and Universities of the State of New York **$19,000**
100 State Street, Suite 714 (over one year)
Albany, New York 12207

For the work of the Association's Financial Policy Development Task Force. (Project director: Joseph J. Blaney, Executive Vice-President and Secretary.)

Carnegie-Mellon University — **$30,000**
Pittsburgh, Pennsylvania 15213 — (over one year)

For a conference on health care benefits. (Project director: Ben Fischer, Director of the Center for Labor Studies.)

Cornell University — **$20,000**
Ithaca, New York 14853 — (over one year)

For a project to assess the relationship between science and the humanities. (Project director: Jonathan Culler, Director of the Society for the Humanities, Andrew D. White House, 27 East Avenue, Ithaca, New York 14853.)

Council on Foundations, Inc. — **$21,700**
1828 L Street, N. W. — (over one year)
Washington, D. C. 20036

For the membership dues of the Sloan Foundation in 1985. (Project director: James A. Josephs, President of the Council.)

Empire State College Foundation — **$20,000**
2 Union Avenue — (over one year)
Saratoga Springs, New York 12866

For a conference entitled "Planning the Electronic University." (Project director: James W. Hall, President of Empire State College.)

Independent Sector — **$20,000**
1828 L Street, N. W. — (over one year)
Washington, D. C. 20036

For a research project on the charitable deduction. (Project director: Brian O'Connell, President.)

Independent Sector — **$5,900**
1828 L Street, N. W. — (over one year)
Washington, D. C. 20036

For the membership dues of the Sloan Foundation in 1985. (Project director: Martin Paley, Treasurer.)

Massachusetts Institute of Technology — **$20,000**
Cambridge, Massachusetts 02139 — (over one year)

For the first phase of a study entitled "Blacks in American Medicine, 1860-1980." (Project director: Kenneth R. Manning, Professor of Humanities.)

Massachusetts Institute of Technology — **$20,000**
Cambridge, Massachusetts 02139 — (over one year)

For the revitalization of the seminar called the Communications Forum. (Project director: Robert S. Kennedy.)

National Executive Service Corps — **$20,000**
622 Third Avenue — (over one year)
New York, New York 10017

A civic grant in support of a program that provides management services to non-profit hospitals in New York City. (Project director: Gerald D. Levy, Executive Vice-President of NESC.)

New York Regional Association of Grant Makers — **$4,700**
630 Fifth Avenue — (over one year)
New York, New York 10111

For the membership dues of the Sloan Foundation in 1985. (Project director: Barrie M. Pribyl, Executive Director.)

Non-Profit Coordinating Committee — **$475**
419 Park Avenue South — (over one year)
New York, New York 10016

For the membership dues of the Sloan Foundation in 1985. (Project director: Marcia Eisenberg, Coordinator.)

Princeton University — **$20,000**
Princeton, New Jersey 08544 — (over one year)

Support for a study of entrepreneurial leadership in government. (Project directors: James W. Doig, Professor of Politics and Public Affairs at Princeton; and Erwin C. Hargrove, Director of the Institute for Public Policy Studies at Vanderbilt University.)

United Way of Tri-State
99 Park Avenue
New York, New York 10016

$3,500
(over one year)

A civic grant made as a contribution to United Way's annual fund-raising drive. (Project director: Calvin Green, President.)

Financial Review

Financial Review

The financial statements and schedules of the Foundation, which have been audited by Ernst & Whinney, independent auditors, appear on pages 72 to 87. They include the balance sheets, the statements of income, expenses and changes in fund balance, changes in financial position, the schedules of management and investment expenses, investments, and grants and appropriations.

Investment and other income for 1985 was $29,803,157, an increase of $2,760,236 from $27,042,921 in 1984. After the deduction of investment expenses and provision for Federal excise tax from investment and other income, net investment income was $27,732,864 in 1985 as compared with $25,346,762 for the prior year. Investment expenses during 1985 totaled $1,041,293, of which $677,382 represented investment counsel fees. Provision for Federal excise tax amounted to $1,029,000. The total of these deductions from income in 1985 was $2,070,293 versus $1,696,159 in 1984.

The total of grants and appropriations authorized net of grant refunds and management expenses during 1985 was $24,232,266. This sum was $3,500,598 under 1985 net investment income. Of this total, grants and appropriations authorized amounted to $22,363,208 while management expenses were $1,944,671. Since the Foundation's inception in 1934, the cumulative excess of grants and expenses over the Foundation's income has amounted to $37,371,933.

Grant and appropriation payments in 1985 were $19,234,455, compared with $17,083,690 the prior year. Together with management expenses, investment expenses, Federal excise taxes paid and other charges, the total of cash expenditures net of grant refunds in 1985 was $23,050,740, while in 1984 the amount was $20,451,687.

The market value of the Foundation's total assets was $434,510,048 at December 31, 1985, including investments valued at $434,481,960, as compared with total assets of $371,148,237 at December 31, 1984. A summary of the Foundation's investments at cost and market value at December 31, 1985 appears on page 77.

A listing of grants made during 1985 including grants and appropriations authorized and payments during the year, will be found on pages 83 to 87.

Report of Ernst & Whinney Independent Auditors

Board of Trustees
Alfred P. Sloan Foundation
New York, New York

We have examined the balance sheets of the Alfred P. Sloan Foundation as of December 31, 1985 and 1984 and the related statements of income, expenses and changes in fund balance and changes in financial position for the years then ended and the supplementary schedules of investments at December 31, 1985, grants and appropriations for the year then ended and management and investment expenses for the years ended December 31, 1985 and 1984. 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, the financial statements referred to above present fairly the financial position of the Alfred P. Sloan Foundation at December 31, 1985 and 1984, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis. Also, in our opinion, the supplementary schedules referred to above are fairly stated in all material respects in relation to the financial statements taken as a whole.

Ernst & Whinney

New York, New York
January 28, 1986

Balance Sheets

December 31, 1985 and 1984

	1985	1984
Assets		
Investments:		
Fixed income:		
U.S. Government and agency	$ 75,132,927	$ 54,049,351
Corporate and other	83,369,958	84,197,775
	158,502,885	138,247,126
Equity:		
General Motors Corporation	40,158,894	40,462,644
Other	138,163,861	125,630,453
	178,322,755	166,093,097
Total investments (market value: $434,481,960 in 1985 and $370,358,288 in 1984)	336,825,640	304,340,223
Amount due for securities sold, not delivered		650,513
Cash	28,088	139,436
Total	$336,853,728	$305,130,172
Liabilities and Fund Balance		
Grants and appropriations unpaid	$ 19,931,842	$ 16,803,089
Federal excise tax and other liabilities	1,035,621	912,555
Fund balance	315,886,265	287,414,528
Total	$336,853,728	$305,130,172

See accompanying notes to financial statements.

Statements of Income, Expenses and Changes In Fund Balance

For the years ended December 31, 1985 and 1984

	1985	1984
Investment Income:		
Dividends	$ 12,311,914	$ 11,558,859
Interest	17,469,180	15,392,147
Other	22,063	91,915
	29,803,157	27,042,921
Less:		
Investment expenses	1,041,293	936,159
Provision for Federal excise tax	1,029,000	760,000
	2,070,293	1,696,159
Net investment income	27,732,864	25,346,762
Grants and management expenses:		
Grants and appropriations authorized (net of grant refunds of $75,613 in 1985 and $198,875 in 1984)	22,287,595	17,997,333
Management expenses	1,944,671	1,742,689
Total	24,232,266	19,740,022
Grants and expenses less than income for the year	3,500,598	5,606,740
Net gain on disposals of securities	24,971,139	12,982,129
Assets received as remainderman of various trusts		175,003
NET CHANGE IN FUND BALANCE FOR YEAR	28,471,737	18,763,872
Fund balance January 1	287,414,528	268,650,656
FUND BALANCE AT END OF YEAR	$315,886,265	$287,414,528

See accompanying notes to financial statements.

Statements of Changes in Financial Position

For the years ended December 31, 1985 and 1984

	1985	1984
SOURCE OF FUNDS:		
Investment income	$29,803,157	$27,042,921
Net gain on disposals of securities	24,971,139	12,982,129
Other		164,687
	54,774,296	40,189,737
APPLICATION OF FUNDS:		
Grant and appropriation payments (net of grant refunds of $75,613 in 1985 and $198,875 in 1984)	19,158,842	16,884,815
Management expenses	1,944,671	1,742,689
Investment expenses	1,041,293	936,159
Federal excise taxes paid	759,862	888,024
Other	146,072	
	23,050,740	20,451,687
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Cost of investments	32,485,417	19,026,281
Amount due for securities sold, not delivered	(650,513)	650,513
Cash balances	(111,348)	61,256
NET INCREASE	$31,723,556	$19,738,050

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 management expenses are recorded on the cash basis, the effect of which on the accompanying financial statements is not materially different from the accrual basis.

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

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 $145,761 and $140,585 for 1985 and 1984, respectively.

3. LEASE

The Foundation's lease for its office space expires April 30, 1993. The lease contains an escalation clause which provides for rental increases resulting from increases in real estate taxes and certain other operating expenses. Under the lease, rent was $532,426 in 1985 and $479,122 in 1984 before sublease income.

4. FUND BALANCE

Fund balance, at year end, is comprised of the following:

	1985	1984
Principal	$353,258,198	$328,287,059
Income—cumulative excess of grants and expenses over income from inception of the Foundation	(37,371,933)	(40,872,531)
Fund balance	$315,886,265	$287,414,528

Schedules of Management and Investment Expenses

For the years ended December 31, 1985 and 1984

	1985	1984
MANAGEMENT EXPENSES		
Salaries and employee benefits:		
Salaries	$1,015,637	$ 853,972
Employees' retirement plan and other benefits	315,118	292,858
Total	1,330,755	1,146,830
Rent (Net of sublease rentals of approximately $16,000 and $45,000, respectively)	511,391	417,730
Program expenses	251,969	302,909
Office expenses and services	138,805	135,544
Reports and publications	25,273	44,652
Professional fees	50,389	36,638
Total management expenses	2,308,582	2,084,303
Less management expenses applicable to investments	363,911	341,614
Management expenses applicable to grant making	$1,944,671	$1,742,689
INVESTMENT EXPENSES		
Investment counsel fees	$ 677,382	$ 594,545
Management expenses applicable to investments	363,911	341,614
Total investment expenses	$1,041,293	$ 936,159

Schedule of Investments

December 31, 1985

SUMMARY	Cost	Market Amount	Market Percent of Total Investment
Fixed income:			
U.S. Government and agency	$ 75,132,927	$ 79,039,777	18.2%
Corporate and others	83,369,958	87,673,208	20.2
Total fixed income	158,502,885	166,712,985	38.4
Equity:			
General Motors Corporation	40,158,894	70,646,413	16.2
Other	138,163,861	197,122,562	45.4
Total equity	178,322,755	267,768,975	61.6
Total investments	$336,825,640	$434,481,960	100.0%

FIXED INCOME	Principal	Cost	Market
U.S. Government and Agency Obligations:			
U.S. Treasury:			
12¾% Notes 11/15/89	$ 3,000,000	$ 3,124,221	$ 3,397,500
10¼% Notes 7/15/90	10,000,000	9,787,344	10,781,200
9⅛% Notes 2/15/91	13,025,000	13,335,709	13,350,625
10⅛% Notes 5/15/93	15,000,000	15,126,562	15,993,750
11¼% Notes 5/15/95	13,650,000	14,739,722	15,467,088
9½% Notes 11/15/95	8,000,000	7,990,387	8,260,000
Government National Mortgage Association			
11, 11½% Pools 2010-2015	11,268,384	11,028,982	11,789,614
Total U.S. Government and Agency		75,132,927	79,039,777
Corporate and other:			
Short term:			
Interest bearing demand notes	267,000	267,000	267,000
Commercial Paper:			
Commonwealth Bank of Australia 10.71% 1/2/86	5,775,000	5,775,000	5,775,000
Creditanstalt Finance Inc. 10.71% 1/2/86	23,466,000	23,466,000	23,466,000
Time Deposit:			
Barclays Bank, PLC 7¼% 1/2/86 (Deutsche Marks)	359,962	143,469	147,374
Total Short term		29,651,469	29,655,374
Long term:			
Air Products and Chemicals, Inc.			
14⅝% Notes 8/1/87	1,000,000	995,000	1,090,050
12¼% Notes 4/15/94	3,000,000	2,917,740	3,368,970
American Telephone and Telegraph Company			
13¼% Notes 3/15/91	2,000,000	1,904,600	2,071,360

Schedule of Investments

December 31, 1985
(continued)

FIXED INCOME	Principal	Cost	Market
Corporate and other (continued):			
Long term (continued):			
Amoco Corp.			
14% Notes 6/1/91	$ 3,000,000	$ 2,989,080	$ 3,406,620
Chesapeake & Ohio Railway Company			
8½% Conditional Sale Agreement 1/1/89	387,198	312,088	384,777
Citicorp			
13⅛% Notes 5/1/89	5,000,000	5,000,000	5,299,150
Connecticut General Life Insurance Company			
10¼% Funding Agreement 11/12/88	7,000,000	7,000,000	7,227,500
E.I. duPont de Nemours and Company			
14% Notes 12/1/91	3,000,000	2,915,000	3,422,700
First Interstate Bancorp			
9.7% Extendible-Adjustable Rate Notes 8/15/90	4,100,000	4,042,345	4,135,711
Ford Motor Credit Company			
12.20% Notes 3/28/90	3,000,000	3,000,000	3,275,520
General Motors Acceptance Corporation			
12¼% Notes 10/1/87	2,000,000	2,043,040	2,118,460
14⅝% Notes 6/15/89	2,000,000	1,956,180	2,204,080
Household Finance Corporation			
10¼% Notes 12/1/87	3,500,000	3,491,250	3,625,860
International Bank for Reconstruction and Development			
14⅛% Notes 8/1/87	3,000,000	3,321,570	3,270,150
Mellon Bank, N.A.			
11.60% Certificate of Deposit 1/13/89	1,600,000	1,592,000	1,716,912
NCNB Corporation			
14½% Notes 9/1/92	3,000,000	3,007,500	3,514,110
SCOA Industries, Inc.			
10% Convertible Subordinated Debentures 9/1/2007	1,000,000	1,223,020	1,325,000
Standard Oil Company (Ohio)			
13⅜% Notes 9/15/92	3,000,000	2,981,250	3,419,550
Woolworth Holding, PLC			
8½% Cumulative Unsecured Loan 10/31/2000 (Sterling)	20,400	26,826	38,274
Xerox Corporation			
10½% Notes 3/1/88	3,000,000	3,000,000	3,103,080
Total long term		53,718,489	58,017,834
Total corporate and other		83,369,958	87,673,208
Total fixed income securities		$158,502,885	$166,712,985

Schedule of Investments

December 31, 1985
(continued)

EQUITY	Number of Shares	Cost	Market
United States:			
Allied-Signal, Inc.	96,300	$ 4,133,418	$ 4,502,025
Associated Dry Goods Corporation	75,000	980,955	2,840,625
Atlantic Richfield Company	50,900	2,557,974	3,244,875
Bell Atlantic Corporation	19,000	1,271,327	2,023,500
British Petroleum PLC, ADR	64,400	1,773,383	2,084,950
Burlington Industries, Inc.	53,800	1,435,238	1,714,875
Burlington Northern, Inc.	16,100	939,585	1,098,825
CBI Industries, Inc.	15,000	326,422	298,125
CPC International, Inc.	62,400	2,573,067	3,182,400
CSX Corporation	64,400	1,623,244	1,948,100
Champion International Corporation	122,800	3,308,760	3,054,650
Chase Manhattan Corporation	57,300	2,502,369	4,161,413
Chemical New York Corporation	66,600	1,884,134	3,021,975
CIGNA Corporation	32,000	1,992,396	2,056,000
Citicorp	56,300	1,767,370	2,779,813
Community Psychiatric Centers	64,000	1,643,622	1,808,000
Consumers Power Company	214,000	1,595,113	1,605,000
Crystal Brands, Inc.	9,660	170,353	219,765
Diamond Shamrock Corporation	127,400	2,921,473	1,767,675
Diamond Shamrock Offshore Partners, Ltd.	704	15,136	12,992
Exxon Corporation	34,000	1,865,386	1,874,250
First Chicago Corporation	64,000	1,412,150	1,888,000
First Financial Corporation Wisconsin	14,000	245,052	245,000
Fremont General Corporation	64,000	1,554,125	1,560,000
General Electric Company	55,200	1,506,879	4,015,800
General Mills, Inc.	48,300	2,332,848	2,952,338
General Motors Corporation	925,000	39,136,649	66,865,475
General Motors Corporation, Class E	92,500	1,022,245	3,780,938
Genstar Corporation	113,600	1,842,615	2,712,200
Gulf & Western Industries, Inc.	32,200	1,486,974	1,601,950
Gulfstream Land and Development Corporation	38,900	709,487	1,424,713
Halliburton Company	64,400	1,883,333	1,771,000
Imperial Chemical Industries, Ltd.	32,200	1,206,212	1,416,800
International Business Machines Corporation	162,000	5,915,026	25,191,000
Kansas Gas & Electric Company	192,400	2,365,418	2,717,650
Kenner Parker Toys, Inc.	14,490	225,417	228,218
Koppers Company, Inc.	31,200	616,217	655,200
Lilly (Eli) & Company	11,800	729,186	1,315,700
MCorp	64,400	1,350,435	1,304,100
Manufacturers Hanover Corporation	65,200	2,334,569	3,072,550
Mapco, Inc.	64,200	2,277,203	2,439,600

Schedule of Investments

December 31, 1985
(continued)

EQUITY	Number of Shares	Cost	Market
United States: (continued)			
Marion Laboratories, Inc.	47,000	$ 2,139,131	$ 2,150,250
Marriott Corporation	16,100	1,531,023	1,754,900
Maxicare Health Plans, Inc.	80,500	1,622,075	1,690,500
Morgan (J.P.) & Company, Inc.	140,000	1,310,880	8,977,500
Motorola, Inc.	86,100	2,928,054	3,347,138
Northern Indiana Public Service Company	289,800	3,402,610	2,861,775
NYNEX Corporation	38,100	2,516,290	3,724,275
Pacific Telesis Group	64,000	4,217,850	5,416,000
Penney (J.C.) Company	88,600	3,916,630	4,917,300
Philip Morris Companies, Inc.	32,200	2,815,499	2,845,675
Punta Gorda Isles, Inc.	30,000	403,755	150,000
Ryans Family Steak Houses, Inc.	73,200	1,210,075	1,601,250
Schlumberger, Ltd.	55,675	743,457	2,032,138
Sears, Roebuck & Company	77,610	1,338,040	3,026,790
Shell Transport & Trading Company, PLC (NY shares)	128,600	4,813,291	4,983,250
S I Handling Systems, Inc.	28,000	462,825	231,000
Southwestern Bell Corporation	22,200	1,237,262	1,898,100
Syntex Corporation	78,400	2,231,176	3,665,200
Tenneco, Inc.	74,200	2,994,437	2,949,450
Texas Oil & Gas Corporation	64,400	1,121,932	990,150
Texas Utilities Company	42,700	1,031,467	1,275,663
Toys "R" Us, Inc.	64,800	2,439,234	2,276,100
U.S. Health Care Systems, Inc.	31,000	511,500	631,625
US West, Inc.	22,200	1,215,936	1,975,800
Union Carbide Corporation	29,600	1,193,916	2,097,900
United Technologies Corporation	93,300	3,528,357	4,081,875
White Consolidated Industries, Inc.	84,300	2,874,464	2,929,425
Australia, Hong Kong and Singapore:			
Ariadne Australia, Ltd.	200,000	246,308	293,260
China Light and Power Company	144,000	179,675	284,053
Dunlop Olympic, Ltd.	3,941	3,805	6,988
Hang Lung Development Company, Ltd.	375,000	168,299	331,433
Hong Kong and Kowloon Wharf and Godown	300,000	243,296	288,203
Singapore International Airlines	140,000	370,220	288,783
Singapore Press Holdings, Ltd.	60,000	176,187	161,122
Swire Pacific, Ltd.	82,157	294,392	328,860
Federal Republic of Germany:			
BASF	128	9,080	13,521
Bayer International Finance AG (warrants)	10,000	380,281	515,865
Deutsche Bank AG	1,500	203,796	575,435

Schedule of Investments

December 31, 1985
(continued)

EQUITY	Number of Shares	Cost	Market
Federal Republic of Germany: (continued)			
Dresdner Bank AG	2,035	$ 144,158	$ 374,923
Gute-Hoffnungs-Huette, Aktien Verein	2,000	140,680	199,795
Linde, AG	1,000	199,278	246,469
Mercedes-Automobile & Holding AG	1,278	145,646	588,115
Siemens AG	2,229	292,285	689,918
France, Italy and Netherlands:			
C.S.F. (Thomson-C.S.F.)	4,000	348,191	429,047
Matra SA	1,600	348,173	346,436
Midi (Cie Du)	1,000	485,582	621,186
Montedison SPA	200,000	185,014	327,316
Peugeot SA (warrants)	2,000	63,625	82,612
Royal Dutch Petroleum Co.	1,000	47,612	63,305
Royal Dutch Petroleum Co. (USA)	5,000	219,570	316,810
Unilever NV	1,500	130,999	216,851
Japan:			
Advantest	15,000	367,107	461,019
Canon, Inc.	46,000	212,313	259,770
Casio Computer Company, Ltd.	22,000	125,503	195,702
Daiwa House Industry Company, Ltd.	61,000	242,496	274,363
Daiwa Securities Company, Ltd.	120,000	484,612	470,765
Eisai Company, Ltd.	2,000	10,077	13,193
Fanuc Company, Ltd.	1,080	28,274	39,886
Fuji Photo Film Company, Ltd.	20,000	161,275	202,899
Fujisawa Pharmaceutical Company, Ltd.	1,000	4,212	4,523
Fujitsu, Ltd.	100,000	489,928	539,731
Hitachi, Ltd.	150,000	488,589	584,709
Hitachi Maxell, Ltd.	20,000	330,151	316,842
Honda Motor Company, Ltd.	30,000	164,782	179,910
Jusco Company, Ltd.	86,000	299,136	412,594
Kandenko Company, Ltd.	16,000	157,469	255,872
Kumagai Gumi Company, Ltd.	8,000	23,156	31,184
NCR Japan, Ltd.	25,000	180,612	263,618
NGK Insulator, Ltd.	5,000	15,785	23,113
Nippon Gakki Company, Ltd.	27,000	182,198	215,892
Nitsuko, Ltd.	1,000	2,267	7,746
Okamoto Machine Tool Works, Ltd.	15,000	51,596	42,204
Orient Finance Company, Ltd.	5,000	20,369	23,388
Orient Leasing Ltd.	13,000	139,726	181,909
Sankyo Company, Ltd.	3,000	7,492	16,342
Secom, Ltd.	11,500	218,750	327,586
Shiseido Company, Ltd.	30,000	184,827	215,892

Schedule of Investments

December 31, 1985
(continued)

EQUITY	Number of Shares	Cost	Market
Japan: (continued)			
Sony Corporation	14,000	$ 223,558	$ 285,457
Sumitomo Corporation	59,000	173,632	224,088
TDK Corporation	9,000	177,365	199,250
Taiyo Fishery Company, Ltd.	114,000	161,472	152,684
Taiyo Yuden Company, Ltd.	4,000	17,072	18,011
Takeda Chemical Industries, Ltd.	3,000	10,962	15,592
Tokio Marine and Fire Insurance Company, Ltd.	30,000	91,008	136,432
Yamato Transport Company, Ltd.	1,000	2,287	5,397
Yokogawa Hokushin Electric, Ltd.	4,000	21,257	25,387
Norway, Sweden and Switzerland:			
Ciba-Geigy AG	150	126,433	229,313
Nestle AG (part. ctf.)	600	359,156	465,906
Nestle AG (warrants)	1,174	320,645	594,264
Norsk Data (ADR)	10,000	338,386	517,500
Norsk Hydro AS (ADR)	12,500	224,050	244,125
Saab-Scania AB	4,000	242,894	260,317
Sandoz AG	300	132,954	253,337
Schweiz-Ruckversicherungs (part. ctf.)	286	185,523	329,653
Swissair-Schweiz Luftverkehr AG	300	122,181	260,616
United Kingdom and Canada:			
BTR, Ltd.	40,000	122,239	218,635
British Petroleum Co., PLC	25,000	128,715	201,717
British Telecommunications, PLC	30,000	33,260	83,290
Britoil, PLC	110,000	320,786	330,845
Glaxo Holdings, PLC	13,000	176,263	289,607
Hanson Trust, PLC	65,000	137,210	186,100
Hanson Trust, PLC 5¼% Convertible Cumulative Redeemable Preferred	10,000	13,514	14,460
Lonvest Corporation	8,000	108,288	110,896
Lonvest Corporation (warrants)	4,000	8,970	8,299
Lucas Industries, PLC	58,125	292,892	408,477
Midland Bank, PLC	60,000	283,335	389,552
Pearson, PLC	30,000	136,295	188,703
Prudential Corporation, PLC	20,000	164,290	226,733
Smith (W.H.) and Son (Holdings), PLC	74,250	226,217	296,329
Thorn EMI, PLC	56,000	356,712	324,714
Woolworth Holdings, PLC	24,000	80,149	183,237
Total equity		178,322,755	267,768,975
Total fixed income		158,502,885	166,712,985
Total investments		$336,825,640	$434,481,960

1985
Schedule of Grants and Appropriations

	Unpaid Dec. 31, 1984	1985 Authorized	1985 Payments	Unpaid Dec. 31, 1985
A & T University Foundation, Inc.	$ 100,000	—	$ 100,000	—
Alabama, University of	—	$ 10,900	10,900	—
American Academy of Arts and Sciences	—	347,850	197,850	$ 150,000
American Arbitration Association	—	170,000	85,000	85,000
American Committee on East-West Accord	—	100,000	50,000	50,000
American Council on Education	—	15,000	15,000	—
American Economic Association	100,000	—	100,000	—
American Enterprise Institute for Public Policy Research	200,000	—	100,000	100,000
American Mathematical Association of Two-Year Colleges	30,000	—	30,000	—
American Mathematical Society	—	30,000	30,000	—
Amherst College	—	150,000	50,000	100,000
Arizona, University of	—	14,000	14,000	—
Arizona State University	12,500	—	12,500	—
Aspen Institute for Humanistic Studies	40,000	—	40,000	—
Association for Public Policy Analysis and Management	—	18,000	18,000	—
Association of Colleges and Universities of the State of New York	—	19,000	19,000	—
Association of Governing Boards of Universities and Colleges	—	25,000	25,000	—
Bank Street College of Education	53,775	—	53,775	—
Boys Harbor, Inc.	50,000	—	50,000	—
Brandeis University	250,000	25,000	112,500	162,500
British Columbia, University of	12,500	—	12,500	—
Brookings Institution	259,000	170,000	279,000	150,000
Brown University	—	89,614	47,114	42,500
Bryn Mawr College	150,000	—	75,000	75,000
Bucknell University	150,000	—	80,000	70,000
California, University of	1,195,000	878,171	1,366,671	706,500
California Institute of Technology	37,500	198,550	113,050	123,000
Carleton College	—	250,000	—	250,000
Carnegie Institution of Washington	12,500	—	12,500	—
Carnegie-Mellon University	837,000	120,000	417,000	540,000
Center for Advanced Study in the Behavioral Sciences	—	300,000	100,000	200,000
Center for Cultural and Technical Interchange Between East and West, Inc.	—	112,700	56,700	56,000
Central Institute for the Deaf	12,500	—	12,500	—
Centre for Economic Policy Research	—	30,000	30,000	—
Chicago, University of	37,500	356,000	62,500	331,000

1985
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1984	1985 Authorized	1985 Payments	Unpaid Dec. 31, 1985
Claremont McKenna College	$ 31,000	—	$ 31,000	—
Clarkson University	44,500	—	44,500	—
Cognitive Neuroscience Institute	125,000	—	—	$ 125,000
Colby College	150,000	—	75,000	75,000
Cold Spring Harbor Laboratory	108,000	$ 240,000	98,500	249,500
Colgate University	150,000	—	50,000	100,000
Colorado, University of	12,500	4,500	17,000	—
Colorado School of Mines	—	5,000	5,000	—
Colorado State University	—	25,000	12,500	12,500
Columbia University	75,000	320,000	200,000	195,000
Committee for Economic Development	—	10,000	10,000	—
Connecticut Foundation, University of	12,500	—	12,500	—
Consortium for Mathematics and Its Applications	61,000	—	61,000	—
Cornell University	162,500	87,200	237,200	12,500
Council on Foundations, Inc.	—	21,700	21,700	—
Council on Library Resources	160,000	—	80,000	80,000
Dartmouth College	—	67,000	67,000	—
Davidson College	—	250,000	50,000	200,000
Delaware, University of	57,500	—	57,500	—
Denver, University of	—	22,000	22,000	—
Duke University	293,000	1,262,770	815,270	740,500
Educational Foundation for Nuclear Science	—	19,128	19,128	—
Emory University	—	14,900	14,900	—
Empire State College Foundation	—	20,000	20,000	—
Franklin and Marshall College	150,000	—	50,000	100,000
Fund for the City of New York	—	150,000	30,000	120,000
GMI Engineering and Management Institute	—	250,000	62,500	187,500
Georgia Tech Research Institute	75,000	270,000	332,500	12,500
Gordon Research Conferences	—	10,000	10,000	—
Great Lakes Colleges Association	33,000	—	33,000	—
Grinnell College	50,000	—	50,000	—
Harvard University	825,000	772,413	1,123,913	473,500
Harvey Mudd College	150,000	—	150,000	—
Hoover Institution on War, Revolution and Peace	—	30,000	30,000	—
Hudson River Foundation	—	20,000	20,000	—
Illinois, University of	12,500	102,115	64,615	50,000
Independent Sector	—	25,900	25,900	—
Indiana University Foundation	12,500	25,000	25,000	12,500
Industrial Relations Counselors, Inc.	100,000	—	100,000	—
Institute for Advanced Study	—	135,000	122,500	12,500

1985
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1984	1985 Authorized	1985 Payments	Unpaid Dec. 31, 1985
Institute for International Economics	—	$ 300,000	—	$ 300,000
International Student Pugwash, Inc.	—	20,000	$ 20,000	—
Iona College	—	50,000	50,000	—
Iowa, University of	—	50,000	25,000	25,000
Iowa State University of Science and Technology	$ 25,000	—	25,000	—
Johns Hopkins University	82,500	136,613	159,113	60,000
Kenyon College	—	12,000	12,000	—
Lafayette College	70,000	—	70,000	—
Linguistic Society of America	—	100,000	50,000	50,000
Marine Biological Laboratory	—	23,000	23,000	—
Maryland Foundation, Inc., University of	320,000	85,622	368,122	37,500
Massachusetts, University of	—	25,000	12,500	12,500
Massachusetts Institute of Technology	665,000	2,116,720	1,251,720	1,530,000
Mathematical Association of America	—	18,950	18,950	—
Mathematical Sciences Research Institute	—	10,500	10,500	—
McGill University	50,000	—	25,000	25,000
Memorial Sloan-Kettering Cancer Center	—	2,500,000	500,000	2,000,000
Miami, University of	—	75,000	75,000	—
Michigan, University of	37,500	311,804	203,804	145,500
Michigan State University	12,500	25,000	25,000	12,500
Middlebury College	150,000	—	16,000	134,000
Minnesota, University of	12,500	432,356	237,356	207,500
Missouri, University of	—	25,000	12,500	12,500
Mount Holyoke College	50,000	250,000	50,000	250,000
National Academy of Sciences	227,000	250,000	312,000	165,000
National Bureau of Economic Research, Inc.	275,000	—	225,000	50,000
National Conference on Social Welfare	75,000	95,000	170,000	—
National Executive Service Corps	—	20,000	20,000	—
Nebraska, University of	—	25,000	12,500	12,500
Neurosciences Research Foundation, Inc.	—	300,000	100,000	200,000
New Brunswick, University of	12,500	—	12,500	—
New Mexico, University of	—	45,000	32,500	12,500
New School for Social Research	21,225	—	21,225	—
New York Academy of Sciences	—	10,000	10,000	—
New York Regional Association of Grantmakers, Inc.	—	17,623	17,623	—

1985
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1984	1985 Authorized	1985 Payments	Unpaid Dec. 31, 1985
New York University	$ 365,750	$ 38,928	$ 332,178	$ 72,500
Nonprofit Coordinating Committee of New York, Inc.	—	475	475	—
North Carolina, University of	12,500	35,680	35,680	12,500
Northwestern University	50,000	67,702	105,202	12,500
Notre Dame, University of	12,500	—	12,500	—
Oberlin College	50,000	—	50,000	—
Ohio State University Foundation	25,000	50,000	50,000	25,000
Oregon, University of	—	25,000	12,500	12,500
Pennsylvania, University of	497,500	182,620	392,620	287,500
Pennsylvania State University	12,500	—	12,500	—
Pittsburgh, University of	25,000	50,000	50,000	25,000
Polytechnic Institute of New York	12,500	—	12,500	—
Population Council	—	20,000	20,000	—
Princeton University	275,000	1,162,700	855,200	582,500
Princeton University Press	280,150	—	100,000	180,150
Purdue University	—	50,000	37,500	12,500
Rand Corporation	70,000	104,000	174,000	—
Research Foundation of State University of New York	125,000	1,680,970	655,970	1,150,000
Research Foundation of the City University of New York	112,500	39,000	89,000	62,500
Rice University	—	25,000	12,500	12,500
Rochester, University of	162,500	11,500	174,000	—
Rockefeller University	12,500	—	12,500	—
Russell Sage Foundation	—	5,600	5,600	—
Rust College	100,000	—	100,000	—
Rutgers University Foundation	37,500	39,116	64,116	12,500
Salk Institute for Biological Studies	30,000	—	30,000	—
Sigma XI	30,000	—	30,000	—
Smith College	—	106,000	53,000	53,000
South Carolina, University of	12,500	—	12,500	—
Southern California, University of	25,000	20,000	45,000	—
Spelman College	100,000	—	100,000	—
Stanford University	508,000	912,904	660,904	760,000
Swarthmore College	—	150,000	50,000	100,000
Syracuse University	—	175,000	62,500	112,500
Texas, University of	225,000	190,000	377,500	37,500
Trinity College	150,000	—	50,000	100,000
Tufts University	—	200,000	100,000	100,000
Tuskegee Institute	100,000	—	100,000	—
Union College	70,000	—	70,000	—
United Engineering Trustees, Inc.	—	10,000	10,000	—
United Nations Association of the U.S.A.	—	30,000	30,000	—
United Way of Tri-State	—	3,500	3,500	—
Urban Institute	240,000	—	120,000	120,000

1985
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1984	1985 Authorized	1985 Payments	Unpaid Dec. 31, 1985
Utah, University of	—	$ 50,000	$ 25,000	$ 25,000
Vanderbilt University	—	135,000	135,000	—
Vassar College	$ 66,000	250,000	141,000	175,000
Virginia, University of	—	25,000	12,500	12,500
Virginia Commonwealth University	—	25,000	12,500	12,500
Virginia Polytechnic Institute and State University	—	10,000	10,000	—
WGBH Educational Foundation	—	500,000	250,000	250,000
Washington, University of	85,000	172,004	232,004	25,000
Washington University	—	25,000	12,500	12,500
Wayne State University	—	60,000	60,000	—
Wellesley College	105,000	20,000	65,000	60,000
Williams College	50,000	10,000	60,000	—
Wisconsin, University of	—	266,375	96,375	170,000
Wyoming, University of	—	12,000	12,000	—
Yale University	456,000	359,855	490,355	325,500
Sloan Research Fellowships to be granted in ensuing year	2,250,000	—	—	2,250,000
Officer grant appropriation for grants in ensuing year	1,200,000	—	—	1,200,000
Book program	137,198	350,000	198,872	288,326
Other appropriations for grants and related expenses	248,991	(75,648)	82,977	90,366
	16,803,089	22,499,880	19,371,127	19,931,842
Reduction for grant transfers		136,672	136,672	
	$16,803,089	$22,363,208	$19,234,455	$19,931,842

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Alfred P. Sloan Foundation

Founded in 1934 by Alfred P. Sloan, Jr.

Report for 1986

Alfred P. Sloan, Jr.
1875—1966

The Life of Alfred P. Sloan, Jr., in Brief

Alfred Pritchard Sloan, Jr., was born in New Haven, Connecticut, May 23, 1875, the first of five children of Alfred Pritchard Sloan, Sr., and Katherine Mead Sloan. His father, a machinist by training, was then a partner in a small company importing coffee and tea. The family moved to Brooklyn in 1885, where it was particularly active in the Methodist Church. (Young Alfred's maternal grandfather was a Methodist minister.) Alfred, Jr., excelled as a student both in the public schools and at the Brooklyn Polytechnic Institute where he completed college-preparatory schooling. After some delay in being admitted to the Massachusetts Institute of Technology (which considered him too young when he first applied), he matriculated in 1892 and took a degree in electrical engineering in three years as the youngest member of his graduating class.

Mr. Sloan began his working career as a draftsman in a small machine shop, the Hyatt Roller Bearing Company of Newark, New Jersey. At his urging, Hyatt was soon producing a new, durable steel bearing for automobiles. In 1898 he married Irene Jackson of Roxbury, Massachusetts. The next year, at age 24, he became President of Hyatt, where he supervised all areas of the company's business: manufacturing, financing, engineering, and marketing. Hyatt bearings became a standard in the automobile industry, and the company grew rapidly under his leadership. In 1916 the Hyatt Roller Bearing Company, together with a number of other manufacturers of automobile accessories, merged with the United Motors Corporation, of which Mr. Sloan became President. Two years later that company became part of the General Motors Corporation (itself established in 1908 as the General Motors Company), and Mr. Sloan was named Vice President in Charge of Accessories and a member of the Executive Committee.

He was elected President of General Motors in 1923, succeeding Pierre S. du Pont, who said of him on that occasion: "The greater part of the successful development of the Corporation's operations and the building of a strong manufacturing and sales organization is due to Mr. Sloan. His election to the presidency is a natural and well-

merited recognition of his untiring and able efforts and successful achievement." Mr. Sloan had developed by then his system of disciplined, professional management that provided for decentralized operations with coordinated centralized policy control. Applying it to General Motors, he set the Corporation on its course of industrial leadership. The next 23 years—Mr. Sloan's tenure as Chief Executive Officer of General Motors—were years of enormous expansion for the Corporation and of a steady increase in its share of the automobile market.

In 1937 Mr. Sloan was elected Chairman of the Board of General Motors and continued as Chief Executive Officer until 1946. When he resigned from the chairmanship in 1956, the General Motors Board said of him: "The Board of Directors has acceded to Mr. Sloan's wish to retire as Chairman. He has served the Corporation long and magnificently. His analysis and grasp of the problems of corporate management, his great vision and rare good judgment, laid the solid foundation which has made possible the growth and progress of General Motors over the years." Mr. Sloan was then named Honorary Chairman of the Board, a title he retained until his death on February 17, 1966. For many years he had devoted the largest share of his time and energy to philanthropic activities, both as a private donor to many causes and organizations and through the Alfred P. Sloan Foundation, which he established in 1934.

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Harry Weiner
Program Officer (part-time)

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Policies and Procedures

The Alfred P. Sloan Foundation was established in 1934 by Alfred P. Sloan, Jr., and incorporated in the state of Delaware. Over the last three years the annual total of grants and appropriations authorized by the Foundation has averaged $20.5 million. Assets at market value at the end of 1986 were $482.7 million. An annual report, free on request, gives detailed information about all the programs and activities of the Foundation.

The main interests of the Foundation are in higher education, with an emphasis on science, technology, economics, management, and education for the public service, and on instructional programs and problems of society associated with these fields. The Foundation's activities do not extend to primary or secondary education, religion, the creative or performing arts, medical research or health care, or to the humanities. Grants are not made for endowments or for buildings or equipment, and are very rarely made for general support or for activities outside the United States.

General and Particular Programs

In 1969 the Foundation adopted a mode of operation that distinguishes between the "general program," under which the established interests of the Foundation are pursued, and a set of "particular programs," which focus on sharply defined topics for more limited periods of time. Four particular programs were developed and carried to completion between 1969 and 1979: to increase the number of minority students in medicine and management; to support experimental work in educational technology; to help establish the new discipline of neuroscience; and to increase the number of minority students in engineering. Expenditures in these programs ranged from nine to fourteen million dollars over a period of five to seven years.

Three particular programs are now in operation: the Cognitive Science Program is in its final phase and will end early in 1987; the New Liberal Arts Program moved into its fourth year of full operation in 1986; and the Minorities in Public Management Program continued at full maturity. These three particular programs are reviewed at appropriate places in this report.

How to Apply for a Grant

The Foundation's funds are spent in two ways: on programs and activities developed by the Foundation's staff and for which grants are made, usually on a competitive basis, in support of individuals and institutions; and in response to proposals that come unsolicited to the Foundation and that are also judged competitively. In considering both types of proposals, the Foundation often

seeks the advice of outside reviewers. The Foundation unfortunately is obliged to turn down many more proposals, often proposals of great merit, than its resources allow it to support.

Application can be made at any time for support of activities falling within the guidelines indicated above. Grants of $30,000 or less are made throughout the year by the officers of the Foundation; grants over that amount are made by the Trustees who meet five times a year for that purpose. Letters of application are normally sent to the president of the Foundation and include, in addition to details about the applicant and the proposed project, information as to the cost and duration of the work. Officer grants may not include any overhead charge; for trustee grants, at most fifteen percent of direct project costs can be budgeted for overhead. In the case of new applicants, the tax status of the organization that would administer the grant should be included unless it is a recognized institution of higher education.

The Foundation has no deadlines or standard application forms. Often a brief letter of inquiry, rather than a fully developed proposal, is an advisable first step for an applicant, conserving his or her time and allowing the Foundation to make a preliminary response as to the possibility of support.

President's Statement

The Sloan Foundation funds higher education and research in science, technology, economics and public policy. Defining higher education is reasonably simple. Defining research presents more difficulties.

The dictionary on my desk gives as its main definition of research "studious inquiry or examination." A somewhat more useful negative definition was given recently by a member of the Foundation staff: "It isn't research if you know the answer before you begin." Unlike the King of Hearts in Alice in Wonderland, a researcher does not ask the jury to consider its verdict before the evidence has been heard.

The problem suggested by this definition is not a serious one in the natural sciences. To be sure, natural scientists develop hypotheses to which they become committed or even wedded, but sooner or later these hypotheses will be modified or abandoned if they are not supported by evidence or logical proof. So far as I know, one does not find research organizations in the natural sciences committed to particular hypotheses. There have been a few celebrated recent cases of fraud in the natural sciences, but these seem to be motivated much more by desire for personal advancement than by overzealous dedication to an hypothesis.

The situation is more complicated in economics and public policy. Research on applied economics and public policy done in universities and the best free-standing research institutions involves careful examination of the evidence, which often leads to policy conclusions and even policy recommendations. The Sloan Foundation often supports such research. The individual scholars in such organizations sometimes have strong policy predilections, but the institutions as such do not, and the views of colleagues may serve as a check on rash conclusions.

In addition to universities and well-established free-standing research organizations, many other organizations and units of organizations do what they call "policy research." These institutions are often committed to particular causes or points of view. Trade associations, labor unions, and civic organizations have research departments staffed by Ph.D.s in economics or other social sciences. New independent research organizations and so-called "think tanks" have multiplied, some with openly declared policy purposes, and their products fill the "op-ed" pages of leading newspapers. The selection of problems and the selection of evidence in such research are often managed so that the results support the policy purposes or views of the sponsoring organization. The result has sometimes been called "forensic statistics"—the marshalling of data to support a brief.

The people who engage in and sponsor advocacy research have every right in the world to do so; I certainly do not mean to suggest that they do not.

Moreover, grant-making foundations have every right to support advocacy research if this is in keeping with the purposes established by their founders and their trustees, and many foundations do so. The Sloan Foundation, however, because of its basic commitment to science, does not knowingly support research of this kind. I suspect that we have on occasion made research grants to some scholars whose minds were made up before they started. If so, we have done it inadvertently.

The one conscious exception to this rule is that we have supported research on the effect of tax policy on charitable giving by Independent Sector, an association of non-profit organizations to which the Foundation belongs. I would not classify this grant as support of research in economics. It merely affirms that the non-profit sector, like other parts of our pluralistic society, has the right to defend its self-interest.

Universities and other organizations where basic research in economics and other social sciences is done adhere as closely as possible to the canons of scientific inquiry applicable in all the sciences. To the extent that the Sloan Foundation is able to support social science research, its support is reserved for such organizations.

Ellmore C. Patterson, a Trustee of the Foundation for more than twenty years, retired from the Board in June, 1986. Later in the same month, Frank A. Petito, a Trustee since 1975, died after a brief illness. Both were valued participants in every phase of the Foundation's activity.

In September, 1986, Eric Wanner, a vice president of the Foundation, resigned to accept the presidency of the Russell Sage Foundation. We extend him every good wish for his new endeavors.

Albert Rees

President

Grants and Activities in 1986

Cognitive Science

The Cognitive Science Program is the largest and longest of the seven "particular programs" the Foundation has undertaken since 1969. Its central purpose is to support the advancement and integration of those disciplines that attempt to understand the basis of intelligent behavior: cognitive psychology, neuroscience, linguistics, analytic philosophy, computer science, artificial intelligence, and cognitive anthropology. The program is therefore concerned with nothing less than our understanding of our own mental make-up; with the complex and little understood processes by which human beings reason, remember, acquire language, solve problems, make decisions, and take actions on the basis of information the brain receives through the sensory organs.

The program began in 1977 with grants in academic fields that at the time were only loosely related. The Foundation's early grants helped researchers begin to work together and to develop some understanding of the concepts and methods of one another's disciplines. From these interdisciplinary beginnings many new lines of research emerged. The program entered its second phase in 1979 with major grants to institutions for the development of postdoctoral training programs. The third and final phase of the program, which began in 1981, concentrated on the establishment of nine university centers where long-term programs of training and research in cognitive science can be carried out after the Foundation's support comes to an end. In 1986, the last of these center grants was made to the University of California at Berkeley. In addition, a number of smaller grants were made for projects such as books and science museum exhibits intended to make the current results of cognitive science accessible to a wider public.

The Foundation has been assisted in all aspects of the program by a distinguished advisory committee:

Robert Q. Marston, President Emeritus, University of Florida, Chairman of the Committee

Theodore H. Bullock, Professor of Neurosciences, University of California, San Diego

Jerome A. Feldman, Professor of Computer Science, University of Rochester

William Kessen, Professor of Psychology, Yale University

William A. Nierenberg, Director, Scripps Institution of Oceanography

Sherwood Washburn, Professor Emeritus of Anthropology, University of California, Berkeley

Trustee Grants in Cognitive Science

American Psychological Association $50,000
1200 Seventeenth Street, NW
Washington, D.C. 20036

This project will permit the cognitive science exhibits produced by the Exploratorium (see grant below) to be available throughout the country. The American Psychological Association and the Association of Science-Technology Centers are jointly planning to produce a traveling exhibit for science museums that would provide interactive demonstrations of modern psychological science. The American Psychological Association will be responsible for developing the exhibits and the Association of Science-Technology Centers, with its 170 science museum members, will administer and circulate the exhibition. The APA has received a grant of $412,000 from the NSF and this will cover much of the cost of the exhibit development and production. An additional $50,000 from the Sloan Foundation will permit traveling versions of The Exploratorium's cognitive science exhibits to be incorporated into the American Psychological Association's exhibit. (Project director: Caryl Marsh, Director, Traveling Psychology Exhibition; Grant period: January 1987-December 1988.)

The Exploratorium $200,000
3601 Lyon Street
San Francisco, California 94123

This grant to a celebrated science museum is part of the Foundation's effort to increase popular understanding of cognitive science. Founded in 1969 by Frank Oppenheimer, the Exploratorium has pioneered the development of interactive exhibits that ingeniously engage museum visitors in making scientific observations and understanding their implications. The central place of perceptual experience in scientific observation has long been an important theme at the Exploratorium. The museum now proposes not only to renovate its perception exhibits, but also to develop a new set of exhibits reflecting recent work in cognitive science. In order to develop these exhibits, The Exploratorium will work with a distinguished board of scientists, some of whom would be supported to spend extended periods of time at The Exploratorium, conduct seminars and workshops at the museum, and consult on aspects of the exhibits. The Foundation's grant will be used to pay for this visiting scientist program as well as for the development and testing of a new portfolio of exhibits in cognitive science. (Project director: Virginia Carollo Rubin, Acting Director; Grant period: November 1986-October 1988.)

Massachusetts Institute of Technology **$80,000**
Cambridge, Massachusetts 02139

One of the main barriers to a more unified cognitive science is the difficulty that specialists in one of the cognitive subfields have in learning the basics of the other subfields. Therefore, it would be very useful if there were one reference work containing a basic set of tutorials on fundamental issues across the cognitive sciences. This grant will allow The MIT Press to produce such a reference book. The basic plan is for a book of 20 to 30 chapters, each covering a foundational topic in linguistics, cognitive psychology, neuroscience, computer science, or the philosophy of the mind. These chapters will be written by specialists in the appropriate subfields and will be edited by a ten-person editorial board chosen by the Press in consultation with the Foundation and appropriate members of the research community in cognitive science. Professor Michael Posner, Washington University School of Medicine has agreed to serve as head of this editorial board. (Project director: Henry B. Stanton, Executive Editor, The MIT Press/Bradford Books; Grant period: February 1986-December 1987.)

Research Foundation of The City University of New York **$44,000**
1515 Broadway
New York, New York 10036

A principal tenet of cognitive science is the so-called "modularity thesis" which holds that different cognitive processes, such as language understanding and recognition of familiar faces, are carried out by separate "mental organs." This view contrasts with the proposition held elsewhere that the mind is a sort of general purpose computer which is simply programmed differently to perform different tasks. Like many of the fundamental propositions of cognitive science, this one is not without controversy. It represents, however, one of the core hypotheses in the field. This grant will permit Professors Jerry Fodor (CUNY) and Professor Zenon Pylyshyn (University of Western Ontario) to make a definitive review of the modularity thesis, thus summarizing current evidence on this important hypothesis as the Foundation's program in cognitive science draws to a close. (Project director: Jerry A. Fodor, Professor of Psychology; Grant period: September 1986-December 1988.)

University of California, Berkeley **$1,000,000**
Berkeley, California 94720

This is the second installment of a total grant of $2.5 million to develop a center of excellence in research and graduate education in cognitive science. The Berkeley "Institute of Cognition" outlined in the original proposal is now fully operational. It includes a large computer system linked to several research laboratories in specialized areas of cognitive science at other points around the campus. These include the Child Language Archive, the Phonology Laboratory, the Visual Information Processing Laboratory, and the Discourse Laboratory. Approximately twenty full-time faculty from five different departments (linguistics, computer science, education, philosophy and psychology) are active participants in this program. These faculty meet regularly in a research seminar that involves a number of interdisciplinary collaborations and has generated over thirty research reports published by the Berkeley Institute. Each participating faculty member is provided with support for a graduate research assistant, and many of these faculty-graduate student collaborations cross department boundaries. One unique and very attractive aspect of the program is a weekly research seminar run by the graduate students who are cognitive science research assistants. This grant will allow all these activities to continue through 1988. (Project director: Robert Wilensky, Director, Berkeley Cognitive Science Program; Grant period: November 1986-December 1988.)

Computational Neuroscience

As the Foundation's program in cognitive science moves through its final stage, the Trustees have recognized a special opportunity to encourage the application of theoretical techniques developed in cognitive science to empirical problems arising out of neuroscience, a related field in which Sloan had an earlier "particular program." Although neuroscience has made great strides in charting the anatomy and physiology of the nervous system, it has been much less successful in achieving an understanding of how the nervous system functions to produce adaptive and intelligent behavior. Recently, a small group of neuroscientists has begun to approach these problems by using computer simulation, mathematical modeling, and other computational techniques to study the function of single nerve cells, small networks of cells, and larger neural systems such as those underlying vision and coordinated action. The Foundation's program in computational neuroscience—a subdivision of our particular program in cognitive science—is designed to nurture both the development and testing of computational theories of nervous system functioning.

During the first phases of this program, in 1984 and 1985, the Foundation funded a number of integrative activities, such as workshops and conferences for senior scientists, and a summer course introducing advanced students in neuroscience to the techniques of computational modeling. In 1986, we turned to direct support of collaborative research designed to test computational models

of the functioning of the nervous system. About 30 outstanding neuroscientists, each with a demonstrated interest in the computational approach, were invited to form collaborative research groups, select a particular computational model for study and propose a program of tests.

Twenty proposals were submitted and reviewed by the following advisory committee:

Horace B. Barlow, Professor of Physiology, Cambridge University

Jack D. Cowan, Professor of Applied Mathematics and Theoretical Biology, University of Chicago

Michael S. Gazzaniga, Professor of Psychology and Neurology, Cornell Medical School

Stephen Kosslyn, Professor of Psychology, Harvard University

Gerald E. Loeb, Laboratory of Neural Control , National Institutes of Health

Gunther S. Stent, Professor of Molecular Biology, University of California at Berkeley

The five projects approved for funding in this first round of competition, to be carried out at six university centers, are described below. (An additional group of grants is planned for early in 1987, following the Advisory Committee's reviews of proposals submitted in a second round of competition.) A sixth project, not part of the competition, at Woods Hole, completes the list of trustee grants in computational neuroscience for 1986.

Harvard University **$143,000**
Cambridge, Massachusetts 02138

Massachusetts Institute of Technology **$56,000**
Cambridge, Massachusetts 02139

This collaboration between robotics expert Raibert and biophysicist McMahon is aimed at testing Raibert's computational theory of legged locomotion by means of kinesiological studies of quadruped running. (Project directors: Thomas A. McMahon, Professor of Applied Mechanics and Biology, Harvard and Marc H. Raibert, Associate Professor of Electrical Engineering and Computer Science, MIT; Grant period: November 1986-December 1988.)

Johns Hopkins University **$198,000**
Baltimore, Maryland 21218

An experimental neuroscientist (Poggio) at the School of Medicine and a biophysicist (Sejnowski) will collaborate on developing and testing a new model of depth perception. Current computational models make incorrect predictions about the degree to which neurons in the visual cortex are sensitive to disparities between the images coming from the two eyes. Poggio and Sejnowski hope to show how depth information can be computed even with broadly tuned disparity-sensitive cells. (Project directors: Gian T. Poggio, Professor of Neuroscience and Terrence J. Sejnowski, Associate Professor of Biophysics and Biology; Grant period: November 1986-December 1988.)

Rockefeller University **$197,000**
New York, New York 10021

It is proposed to modify and carry out a testing program for Land's retinex theory of color vision. (Project directors: Robert Shapley, Associate Professor of Biophysics, and James Gordon, Adjunct Professor, Laboratory of Biophysics; Grant period: November 1986-December 1988.)

Stanford University **$200,000**
Stanford, California 94305

An extensive series of behavioral and neurophysiological experiments will be undertaken on a computational model of learning derived from Thompson's pathbreaking discovery of a neural circuit in the cerebellum that mediates classical conditioning. (Project directors: Richard F. Thompson and Gordon Bower, Professors of Psychology; Grant period: November 1986-December 1988.)

University of Alabama at Birmingham **$300,000**
Birmingham, Alabama 35294

David Sparks, Frank Amthor, and Michael Friedlander will test computational models of the way in which the direction of motion is visually perceived, of the control of visual attention, and of the control of saccadic eye movements. The University of Alabama at Birmingham has very active laboratories in neurophysiology and biophysics and Sparks, Amthor, and Friedlander propose to collaborate with theorists at MIT, Caltech, and the NIH. (Project directors: Frank R. Amthor, Assistant Professor of Psychology; Michael J. Friedlander and David L. Sparks, Professors of Physiology and Biophysics; Grant period: November 1986-December 1988.)

Marine Biological Laboratory **$62,400**
Woods Hole, Massachusetts 02543

In 1985, the Foundation made an officer grant to the Woods Hole Biological Laboratory in support of a two-week summer workshop for biologists and computer scientists interested in computational neuroscience. A variety of computational facilities were made available on site so that various computational models could be demonstrated and tested by participants during the workshop. This format worked so well that the Foundation decided to support it for three more years. We believe that the Woods Hole workshop provides an important integrative mechanism for computational neuroscience. Moreover, it nicely complements other Sloan efforts in the field, such as the Cold Spring Harbor summer course for younger scientists entering the field and the Neuroscience Institute workshops at Rockefeller University. (Project director: Terrence J. Sejnowski, Associate Professor of Biophysics, Johns Hopkins University; Grant period: July 1986-September 1988.)

Officer Grants in Cognitive Science and Computational Neuroscience

Gordon Research Conferences **$7,000**
University of Rhode Island
Kingston, Rhode Island 02881

Partial support for a Gordon Research Conference on the cybernetics of cognition. (Project director: Heinz Von Foerster, Professor Emeritus of Biophysics and Physiology, University of Illinois; Grant period: February 1986-December 1986.)

Hampshire College **$24,000**
Amherst, Massachusetts 01003

To conduct a summer workshop for teachers of undergraduate cognitive science. (Project director: Neil A. Stillings, Associate Professor of Psychology; Grant period: February 1986-December 1986.)

Princeton University **$24,500**
Princeton, New Jersey 08544

For a study of the development of the inferior temporal cortex. (Project director: Charles G. Gross, Professor of Psychology; Grant period: June 1986-December 1986.)

Rochester Institute of Technology **$26,000**
Rochester, New York 14623

For a national conference on theoretical issues in sign language. (Project director: Susan D. Fischer, Associate Professor of Communication Research; Grant period: February 1986-December 1986.)

Santa Fe Institute **$30,000**
Post Office Box 9020
Santa Fe, New Mexico 87504

For a summer workshop on Interdisciplinary Aspects of Complex Adaptive Systems. (Project director: Marcus W. Feldman, Director; Grant period: June 1986-December 1986.)

Society for Neuroscience **$8,000**
11 Dupont Circle, NW
Washington, D.C. 20036

Support for travel by U.S. participants to the Second World Congress of Neuroscience to be held in Budapest in 1987. (Project director: Dominick P. Purpura, Professor of Neuroscience, Albert Einstein College of Medicine; Grant period: November 1986-December 1987.)

University of Massachusetts at Amherst **$20,000**
Amherst, Massachusetts 01003

For partial support of the annual meeting of the Cognitive Science Society. (Project director: Charles Clifton, Professor of Psychology; Grant period: January 1986-December 1986.)

University of Massachusetts at Amherst **$23,000**
Amherst, Massachusetts 01003

Support for a book on computational neuroscience for the general reader. (Project director: Michael A. Arbib, Professor of Computer Science; Grant period: September 1986-December 1988.)

Yale University **$20,000**
New Haven, Connecticut 06520

For support of work on the history of developmental psychology. (Project director: William Kessen, Professor of Psychology; Grant period: January 1986-August 1987.)

Economics

The Foundation's activities in economics continued to be substantial. Economists were among awardees of Sloan Research Fellowships and Dissertation Fellowships, as summarized elsewhere in this report. Our successful experience, over many years, in supporting university workshops in economics led to another set of such grants in 1986. The program in behavioral economics, initiated a year ago, was expanded. A variety of other research projects and activities in economics received support by means of both trustee and officer grants.

Economics Workshops

From 1974 to 1984 the Foundation supported graduate-level research workshops in applied microeconomics. Two rounds of competition were held during those years and 22 grants made to leading economics departments to stimulate new work in microeconomics and to train doctoral candidates in the methods of microeconomics research. Details of these grants were reported in our previous annual reports.

In 1985, following a very favorable review of the program, a third round of competition was authorized for workshops on the general theme of the increased openness of the United States economy and the significance of that fact for understanding both the internal behavior of the economy and its role in the world. This theme was developed by a distinguished advisory committee:

Robert Solow, Massachusetts Institute of Technology, Chairman

Alan Blinder, Princeton University

Richard Cooper, Harvard University

D. Gale Johnson, University of Chicago

Paul Joskow, Massachusetts Institute of Technology

Ann Krueger, Duke University

Charles Schultze, Brookings Institution

Among suitable topics for this new set of workshops, the Committee identified the following: open-economy macroeconomics, international financial markets, comparative analysis of institutions across countries, the nature of trade in the modern world, rethinking of traditional policy analysis in a more open economy, and demography and immigration.

Twenty-five leading economics departments were invited to apply for grants in 1985 or 1986. Sixteen universities submitted proposals for 1985 grants and five awards were made. The advisory committee reviewed proposals from 12 universities (four carry-overs) for 1986 grants. Four were awarded grants for workshops, as follows:

Duke University **$255,000**
Durham, North Carolina 27706

For a workshop to study various issues falling into four categories: econometric investigations of capital mobility; rates of return to capital in competitive equilibrium; implications and sources of capital immobility; fiscal policy and capital mobility. (Project director: Kent P. Kimbrough, Associate Professor of Economics; Grant period: February 1986-June 1991.)

University of Chicago **$255,000**
Chicago, Illinois 60637

For a workshop in international economics, to be run jointly by the Department of Economics and the Graduate School of Business, focusing on various aspects of open-economy macroeconomics, the behavior of nominal and real exchange rates, the choice of exchange rate systems, and issues in trade policies. (Project directors: Jacob A. Frenkel, Professor of International Economics and Michael L. Mussa, Professor of International Business; Grant period: February 1986-June 1989.)

University of Rochester **$255,000**
Rochester, New York 14627

For a workshop program directed to general equilibrium analysis of international markets for real goods and financial assets, to determine the effects of increased openness of the United States economy. (Project directors: Ronald W. Jones and Alan C. Stockman, Professors of Economics; Grant period: February 1986-June 1991.)

University of Western Ontario **$255,000**
London, Ontario N6A 5C2

For a workshop in international economics located in the Centre for the Study of International Economic Relations, concentrating on United States-Canada bilateral trade and the global trading system, extensions of the Heckscher-Ohlin model, numerical general equilibrium analysis of trade policy, and open-economy macroeconomics. (Project directors: James K. Markusen and James R. Melvin, Professors of Economics; Grant period: February 1986-June 1989.)

Behavioral Economics

In 1985, the Foundation initiated an exploratory program in the newly developing area of behavioral economics. The central premise underlying this nascent field is the belief that traditional economic analysis can be significantly enriched by making use of the results and techniques of the neighboring behavioral and social sciences. Modern economics employs a highly simplified set of assumptions about the nature of human rationality and human motivation. Although these assumptions have proved reasonably effective and have supported what is arguably the most successful of the social sciences, there are clearly many areas where both the coverage and the empirical accuracy of economic theory might be improved. The behavioral approach suggests that this improvement might be achieved by incorporating more empirically accurate assumptions about individual human behavior and about social processes into economic models and theories. Four initial grants in behavioral economics were made in 1985.

In 1986, the Foundation held a competition for small grants of up to $50,000 in behavioral economics for efforts to develop and test behavioral models, for observational studies of economic decision making in real settings, and for experiments with simulated markets designed to examine the market consequences of psychological and social processes. The following Advisory Committee oversaw this competition and will continue to assist the Foundation on the future of the program:

Robert Abelson, Professor of Psychology, Yale University

William J. Baumol, Professor of Economics, Princeton University

Leon Festinger, Professor of Psychology, New School for Social Research

Thomas C. Schelling, Professor of Economics, Harvard University

Thirteen grants were approved this year, as follows:

Cornell University **$27,000**
Ithaca, New York 14853

For continued research on the economic consequences of beliefs about fairness. (Project director: Richard Thaler, Professor of Economics; Grant period: July 1986-September 1987.)

Harvard University **$23,000**
Cambridge, Massachusetts 02138

For a study of "noise traders" in the stock market. (Project director: Lawrence Summers, Professor of Economics; Grant period: April 1986-June 1987.)

Harvard University **$50,000**
Cambridge, Massachusetts 02138

For research on the psychology of stock trading and prices. (Project director: Paul Andreassen, Assistant Professor of Psychology; Grant period: May 1986-June 1987.)

Stanford University **$30,000**
Stanford, California 94305

For a research seminar on behavioral economics. (Project director: Kenneth Arrow, Professor of Economics; Grant period: July 1986-September 1987.)

Stanford University **$30,000**
Stanford, California 94305

For an analysis of the consequences of decision biases on investment behavior. (Project director: Amos Tversky, Professor of Psychology; Grant period: July 1986-September 1987.)

University of Arizona **$50,000**
Tucson, Arizona 85721

For research examining the market consequences of apparent individual departures from subjective expected utility. (Project director: Vernon L. Smith, Professor of Economics; Grant period: July 1986-September 1987.)

University of California, Berkeley **$30,000**
Berkeley, California 94720

For a study of the aggregate market consequences of near rational individual behavior. (Project director: George Akerlof, Professor of Economics; Grant period: July 1986-September 1987.)

University of California, Berkeley **$27,000**
Berkeley, California 94720

For a general review of experimental economics, focused particularly on the question of whether non-optimal individual decision strategies are eliminated in simulated markets. (Project director: Daniel Kahneman, Professor of Psychology; Grant period: July 1986-September 1987.)

University of Chicago **$63,000**
Chicago, Illinois 60637

For research on a new model of decision making under uncertainty. (Project directors: Hillel J. Einhorn and Robin M. Hogarth, Professors of Behavioral Science; Grant period: May 1986-June 1987.)

University of Chicago **$20,500**
Chicago, Ilinois 60637

For theoretical work on the problem of altruism in social choice. (Project director: Howard Margolis, Senior Lecturer, Committee on Public Policy; Grant period: April 1986-June 1987.)

University of Houston, University Park **$30,000**
Houston, Texas 77004

For a study of judgmental errors underlying the "winner's curse" in common value auctions. (Project director: John Kagel, Professor of Economics; Grant period: July 1986-September 1987.)

University of Michigan **$14,250**
Ann Arbor, Michigan 48109

For a study of lay understanding of economic principles of choice. (Project directors: Richard Nisbett, Professor of Psychology and James Morgan, Professor of Economics; Grant period: July 1986-September 1987.)

University of Oregon **$50,000**
Eugene, Oregon 97403

For research assessing the quality of value elicitation techniques used to guide policy decisions involving unpriced goods, such as environmental amenities and health hazards. (Project director: Sarah Lichtenstein, Adjunct Professor of Psychology; Grant period: May 1986-June 1987.)

Other Trustee Grants in Economics

American Economic Association **$300,000**
1313 21st Avenue South
Nashville, Tennessee 37317

The Foundation has been a major supporter for many years of the American Economic Association's Summer Program in Economics for Minority Students. The program recruits Black, Hispanic, and Native American undergraduates who show interest in studying for an advanced degree in economics. They are offered an eight-week graduate-level course of study at a major university, designed to give them a stronger foundation in economics, a taste of what graduate school is like, and some exposure to academic and professional options they may not have considered. Summer Program students have entered graduate study programs at more than twenty universities and are by now members of a number of economics faculties. Since 1974, the Program has been held at four different university campuses, most recently at the University of Wisconsin. This grant will support the program for the next three years at Temple University in Philadelphia. (Project director: Michael D. McCarthy, Director, Harry A. Cochran Research Center, Temple University; Grant period: February 1986-February 1989.)

Brookings Institution **$250,000**
1775 Massachusetts Avenue, NW
Washington, D.C. 20036

A Foundation grant in 1970 helped to organize the Brookings Panel on Economic Activity. Now, sixteen years later, the Panel continues to thrive. It meets twice a year and has published important research papers and volumes of conference proceedings. Its research output appeals to a broad audience, reflecting the

Panel's efforts to narrow the gap between macroeconomic research investigations and the needs of practical decision making. Officials at both staff and policy levels at numerous agencies, bureaus, committees, and departments, within both the executive and legislative branches of the federal government, have participated in Panel meetings and have made use of its research findings. Representatives of major companies and other research organizations often attend Panel meetings as observers. In addition to our grants, support has also come from the National Science Foundation and Brookings itself. This grant will help the Panel continue its meetings, publications, and other activities for an additional two years. (Project director: George L. Perry, Senior Fellow; Grant period: July 1986-July 1988.)

Brookings Institution **$125,000**
1775 Massachusetts Avenue, NW
Washington, D.C. 20036

Joseph A. Pechman, former director of the Brookings Economic Studies program and now a senior fellow, is one of the world's pre-eminent public finance scholars. This grant will enable him to study comparative tax policies in nine major industrial nations (Canada, France, Italy, Japan, the Netherlands, Norway, Sweden, United Kingdom, West Germany). His research will provide policy makers in the United States and elsewhere with a succinct analysis of the social and economic effects of a variety of tax policies in place or being proposed in these countries. The project will focus on the following aspects of tax policies: structural features, savings and investment incentives, inflation adjustments, the role of consumption and payroll taxes, the hidden economy, tax treatment of the family, and distribution of tax burdens. (Project director: Joseph A. Pechman, Senior Fellow; Grant period: June 1986-June 1988.)

Columbia University **$150,000**
New York, New York 10027

Dr. Geoffrey Moore is a distinguished student of the business cycle and a former Commissioner of Labor Statistics. He played a leading role in the development of the economic indicators now published regularly by the Department of Commerce and widely used in economic forecasting. Believing that these indicators have gotten badly out of date, Dr. Moore and several colleagues plan to explore possible revisions and improvements. For budgetary reasons, the Department of Commerce is able to contribute only a small part of the cost of this project.

The balance will be furnished by this grant. (Project director: Geoffrey H. Moore, Director, Center for International Business Cycle Research, Graduate School of Business; Grant period: February 1986-December 1987.)

Joint Council on Economic Education **$86,000**
2 Park Avenue
New York, New York 10016

The Joint Council on Economic Education is an independent, nonpartisan, educational organization established about 35 years ago to encourage and improve economic education in the nation's schools. It pursues its goal—basic economic literacy, without attachment to any particular theoretical school of thought in economics — primarily by means of teacher training and the development of curriculum materials. This grant will finance preparation by the JCEE, in conjunction with the American Economic Association's Committee on Education and the College Board, of an Advanced Placement course in economics. The project is supported by many leading economists who are concerned about the teaching of their discipline in secondary schools. This will be the first AP course ever developed for the field. (Project director: Michael A. MacDowell, President; Grant period: April 1986-April 1987.)

Massachusetts Institute of Technology **$375,000**
Cambridge, Massachusetts 02139

An outstanding group of MIT scholars from many disciplines, ranging from economics and management to science and engineering, will be brought together for an intense study of industrial productivity. Three principal issues will be addressed: analysis of the factors that have determined economic productivity in the United States relative to Europe and Japan; examination of the role of technology in determining industrial productivity, especially in the long run, relative to other economic variables; formulation of an appropriate educational and research agenda for scientists and engineers at MIT, directed toward problems of long-term industrial productivity in the U.S. Modifications, even major changes, suggested for current engineering education and research practice will be explored. The findings and conclusions of the study group will be widely communicated to a broad public audience within the U.S. university and research and development communities. This grant is the first of two equal installments to support the work of this interdisciplinary study group. (Project directors: Michael L. Dertouzos, Director, Laboratory for Computer Science, and Robert Solow, Professor of Economics; Grant period: October 1986-December 1988.)

National Bureau of Economic Research, Inc. **$371,500**
1050 Massachusetts Avenue
Cambridge, Massachusetts 02138

The issues of employment, inflation, economic growth, and international trade are central to economic policy. But these broad issues are often avoided in macroeconomic research in favor of narrower technical questions primarily of methodological interest. The National Bureau of Economic Research would like to provide an environment that encourages applied research on major macroeconomic issues and does so in a way that brings together leading practitioners from different "schools" of thought and allows them to discuss the available empirical evidence with those who see the economy differently. Two special activities will be carried out under this grant. First, a workshop on product prices and output fluctuations will look at product markets and use ideas from industrial organization to address one of the central questions of macroeconomics: Why in individual markets does output fluctuate so much and price so little in response to overall economic fluctuations? Workshop participants will include industrial organization specialists and macroeconomic researchers. Second, an annual NBER conference on applied macroeconomics will help focus attention on policy-relevant empirical research and encourage research on current economic problems. (Project directors: Julio J. Rotemberg, Associate Professor of Applied Economics, Sloan School of Management, MIT (workshop) and Stanley Fischer, Professor of Economics, MIT (conferences); Grant period: June 1986-June 1989.)

Rand Corporation **$300,000**
1700 Main Street
Santa Monica, California 90406

Dramatic decreases in the cost of communication and computation and the growth of new information technologies have freed enterprises from conventional locational constraints and changed the ways they organize themselves. This grant will support a series of research studies by the Rand Corporation to explore the contribution of the new technologies to the dispersal of economic activities out of cities and even to sites abroad, the associated problems posed for America's labor force and the financing of local government services, and as a particular case study, the changes that lower communications costs can be expected to have on the structure and locational disposition of the financial services industry. In addition to preparing research papers and a widely distributed final report, Rand will organize a major conference on its findings, with participants drawn from government agencies, private industry, and the academic research community. (Project director: Anthony H. Pascal, Senior Staff Member, Economics Department; Grant period: June 1986-June 1989.)

Rand Corporation **$125,000**
1700 Main Street
Santa Monica, California 90406

Labor economists Finis Welch and James Smith have for many years been studying a wide range of issues related to the Black-White income gap. According to their work, there was a gradual but significant improvement in the economic status of Blacks relative to Whites from 1870 to 1920, followed during the next twenty years by a slight deterioration. Their income series shows a sharp improvement in the economic status of Blacks after 1940. The book they plan to write will include not only their findings on the economic position of Blacks, but will also cover such demographic factors as major migratory movements and fertility, mortality and life expectancy data, the history and effects of Black schools and the Black family. Much of the research work has been done. This grant will enable the authors to complete their research and the preparation of their book. (Project director: James P. Smith, Director, Labor and Population Program; Grant period: June 1986-June 1988.)

University of Utah **$140,000**
Salt Lake City, Utah 84112

Significant changes appear to have occurred over the past few decades in the relative economic conditions of two "dependent" age groups—children and the elderly. A better understanding of the well-being of children and the elderly would serve to inform the inevitable debate on the desirability of programs benefiting one group or the other. How can and how should an aging society preserve (or realign) its priorities between the young and the old? This grant supports research by some 25 scholars on such topics as: tax expenditures on the elderly and the young; wealth (including financial and non-financial assets) of both age groups; allocation of resources within the family; health and health care finance; comparison of U.S. experience with that in Western Europe and Japan; and alternative patterns of support for children and the elderly. A collection of commissioned papers will provide a detailed analysis of the changing socio-economic status of children and the aged in the United States from both intertemporal and comparative international perspectives. The project also involves two meetings, one an early-stage workshop, the second a major conference for comprehensive discussion of all the papers before final editing and publication. (Project directors: Timothy M. Smeeding, Professor of Economics; John L. Palmer, The Urban Institute; and Barbara Torrey, U. S. Bureau of the Census; Grant period: February 1986-December 1987.)

Officer Grants in Economics

A. Philip Randolph Educational Fund **$10,500**
260 Park Avenue South
New York, New York 10010

For preparation of a report on the changing nature of work and the labor movement and the effect of these changes on the Black community. (Project director: Norman Hill, Executive Director; Grant period: January 1986-January 1987.)

American Economic Association **$20,000**
1313 21st Avenue South
Nashville, Tennessee 37212

Support for a survey of past participants in the AEA Summer Program for Minorities. (Project director: C. Elton Hinshaw, Secretary; Grant period: November 1986-April 1987.)

American Productivity Management Association **$20,000**
4711 Golf Road
Skokie, Illinois 60076

Support for writing a book on the "Algebra of Productivity Measurement and Analysis." (Project director: Irving H. Siegel, Consulting Economist; Grant period: March 1986-September 1987.)

Council on Foreign Relations, Inc. **$25,000**
58 East 68th Street
New York, New York 10021

For partial support of a symposium on U. S.-Japan economic and political relations. (Project director: Paul H. Kreisberg, Director of Studies; Grant period: March 1986-July 1986.)

Georgetown University **$18,650**
Washington, D. C. 20057

For support of a study on "The Feminization of Poverty." (Project director: Laurie J. Bassi, Assistant Professor of Economics; Grant period: April 1986-March 1987.)

Massachusetts Institute of Technology **$19,000**
Cambridge, Massachusetts 02139

For a conference entitled "New Developments in Labor Markets and Human Resource Policies." (Project director: Robert B. McKersie, Professor of Industrial Relations; Grant period: September 1986-September 1987.)

National Bureau of Economic Research, Inc. **$22,200**
269 Mercer Street
New York, New York 10003

For a study of the money supply under flexible exchange rates. (Project director: Anna J. Schwartz, Research Associate; Grant period: June 1986-August 1987.)

National Opinion Research Center **$24,500**
6030 South Ellis Avenue
Chicago, Illinois 60637

Support for a conference on economic applications in longitudinal data analysis. (Project director: James J. Heckman, Research Associate; Grant period: November 1986-April 1988.)

New School for Social Research **$15,000**
66 West 12th Street
New York, New York 10011

For support of a study of Joseph Schumpeter as an economic and economic-sociological theorist. (Project director: Robert L. Heilbroner, Professor of Economics; Grant period: January 1986-January 1987.)

Princeton University **$4,000**
Princeton, New Jersey 08544

Partial support for a conference following the publication of *Prices, Competition and Equilibrium*, a volume of essays in honor of economist William J. Baumol. (Project director: Richard E. Quandt, Professor of Economics; Grant period: September 1986-December 1986.)

University of California, Los Angeles **$16,500**
Los Angeles, California 90024

For support of a conference on Risk Measurement: Axiomatics, Experiments, and Applications. (Project director: Rakesh K. Sarin, Associate Professor, Graduate School of Management; Grant period: February 1986-December 1986.)

University of Pennsylvania **$16,000**
Philadelphia, Pennsylvania 19104

For a seminar on economics for federal judges in the Third Judicial Circuit of the United States. (Project director: Michael L. Wachter, Professor of Economics, Law, and Management; Grant period: May 1986-June 1986.)

University of Utah **$6,500**
Salt Lake City, Utah 84112

A supplementary grant for a meeting to discuss first-draft papers prepared for the project on the changing socio-economic status of children and the aged in the United States. (Project director: Timothy M. Smeeding, Professor of Economics; Grant period: February 1986-December 1987.)

University of Wisconsin **$4,200**
Madison, Wisconsin 53706

To complete the monograph, "Work in the American Economy." (Project director: Glen Cain, Professor of Economics; Grant period: February 1986-June 1986.)

Vanderbilt University **$20,000**
Nashville, Tennessee 37240

For study of data on valuations by individuals of hazards and risks they face on their jobs. (Project director: V. Kerry Smith, Professor of Economics; Grant period: May 1986-June 1987.)

Fellowships

Sloan Research Fellowships **$2,250,000**

The Sloan Research Fellowship Program is the oldest active Foundation program. It continues to receive high praise and enjoy an enviable reputation in the academic world. Since 1955 research fellowships have accounted for expenditures of over $45 million and have assisted some 2200 young scientists at more than 175 colleges and universities. Sloan Research Fellows have received numerous prizes and awards in recognition of their major research accomplishments. Eleven Fellows have been awarded the prestigious Fields Medal in mathematics; thirteen have received Nobel prizes, including the three 1986 Nobel laureates in chemistry.

These yearly fellowships are awarded to young scholars in chemistry, economics, mathematics, neuroscience, and physics, or in a related interdisciplinary field. Each award, currently $25,000 over a two-year term, is administered by the Fellow's institution and is designed to allow the greatest possible freedom and flexibility in its use. The Fellow need not pursue a specified research project and is free to change the direction of his research at any time. The award may be used for equipment, technical assistance, professional travel, or any other activity directly related to the Fellow's research. Former Fellows report that this flexibility gives the awards a value well beyond their dollar amount. A brochure entitled "Sloan Research Fellowships" gives details about this program and is available from the Foundation.

Candidates for Sloan Research Fellowships are nominated by department chairmen or other senior scientists, often themselves former Fellows. Within each discipline, a committee composed of three distinguished scientists reviews the nominations and makes the final selections. Committee members are asked, in reviewing nomination forms and supporting documents, to identify those nominees who show the most outstanding promise of making fundamental contributions to new knowledge.

During 1986, the Foundation awarded Research Fellowships to 90 scholars at 48 institutions. To arrive at the final selections, 450 nominations were reviewed by the following committees:

Chemistry
Harry B. Gray, California Institute of Technology
Robin M. Hochstrasser, University of Pennsylvania
Jerrold Meinwald, Cornell University

Economics
David M. Kreps, Stanford University
Christopher A. Sims, University of Minnesota
James Tobin, Yale University

Mathematics
Peter D. Lax, New York University
Barry Mazur, Harvard University
John Milnor, The Institute for Advanced Study

Neuroscience
Gerald D. Fischbach, Washington University
Patricia S. Goldman-Rakic, Yale University
Solomon H. Snyder, The Johns Hopkins University

Physics
Roger Dashen, University of California, San Diego
Hans Frauenfelder, University of Illinois, Urbana-Champaign
William Press, Harvard University

The following scholars, listed by institution and field, received the 1986 awards:

Boston University
Mathematics: Glen R. Hall

Brown University
Physics: Nabil M. Lawandy

California Institute of Technology
Chemistry: Terrence J. Collins
Daniel P. Weitekamp
Mathematics: David Gabai

Case Western Reserve University
Mathematics: Stanislaw J. Szarek

City University of New York, City College
Physics: Michael Dine

Colorado State University
Chemistry: Robert M. Williams

Columbia University
Mathematics: Robert Friedman
Physics: Paul E. Olson
Adrianus M. M. Pruisken
P. Michael Tuts

Cornell University
Chemistry: David B. Collum
Gregory S. Ezra
Mathematics: Dinakar Ramakrishnan

Duke University
Mathematics: Gregory F. Lawler

Harvard University
Economics: David E. Bloom
Neuroscience: S. Martin Shankland
Kenneth L. Tyler
Physics: Mark Birkinshaw
Paul Ginsparg
John Z. Imbrie

Indiana University
Chemistry: Charles T. Campbell

Institute for Advanced Study
Physics: Andrew E. Strominger

Johns Hopkins University
Chemistry: Reuben Jih-Ru Hwu

Massachusetts Institute of Technology
Chemistry: Sylvia T. Ceyer
Economics: Julio Rotemberg
Physics: B. Gabriel Kotliar
John L. Tonry

Michigan State University
Physics: Jeffrey R. Kuhn

New York University
Mathematics: Jonathan B. Goodman

Northwestern University
Economics: Larry E. Jones

Oklahoma State University
Mathematics: J. Brian Conrey

Princeton University
Chemistry: Andrew B. Bocarsly
Warren S. Warren
Neuroscience: Winthrop E. Sullivan
Physics: Jeffrey A. Harvey

Purdue University
Chemistry: Ian P. Rothwell

Stanford University
Chemistry: Michael C. Pirrung
Neuroscience: Richard W. Aldrich
Physics: Aharon Kapitulnik

State University of New York-Stony Brook
Physics: Johanna Stachel

Syracuse University
Physics: Gianfranco Vidali

University of Arizona
Mathematics: Nicholas M. Ercolani
Physics: Craig J. Hogan

University of Calgary
Neuroscience: Brian A. MacVicar

University of California, Berkeley
Chemistry: Peter B. Armentrout
Anthony D. J. Haymet
Economics: Jeffrey A. Frankel
Mathematics: James A. Sethian
Neuroscience: Seth Roberts
Janis C. Weeks

University of California, Davis
Chemistry: Nancy S. True

University of California, Irvine
Neuroscience: Marianne Bronner-Fraser

University of California, Los Angeles
Chemistry: Douglas C. Rees
Mathematics: F. Michael Christ
Jonathan D. Rogawski
Neuroscience: S. Lawrence Zipursky

University of California, San Francisco
Neuroscience: David A. Greenberg

University of California, Santa Barbara
Physics: Mark Srednicki

University of Chicago
Mathematics: Petre S. Constantin
Physics: Mark J. Oreglia

University of Colorado
Physics: Dana Z. Anderson

University of Georgia
Chemistry: Michael K. Johnson

University of Illinois at Chicago
Mathematics: Marc Culler
Lawrence Ein
Henri A. Gillet

University of Illinois at Urbana-Champaign
Chemistry: Robert A. Scott

University of Maryland
Chemistry: Devarajan Thirumalai

University of Massachusetts
Economics: Carol E. Heim
Physics: Judith S. Young

University of Michigan
Mathematics: Larent Clozel
Philip J. Hanlon
John L. Harer

University of Minnesota
Mathematics: Greg W. Anderson

University of North Carolina
Chemistry: Michael T. Crimmins

University of Oregon
Chemistry: David R. Tyler

University of Pennsylvania
Economics: Andrew B. Abel

University of Rochester
Neuroscience: John H. R. Maunsell
Ernest J. Nordeen

University of Texas, Austin
Physics: Ethan T. Vishniac

University of Wisconsin
Chemistry: Robert S. Sheridan
Economics: Kenneth S. Rogoff
Neuroscience: Erik S. Schweitzer

Wayne State University
Neuroscience: Michael J. Bannon

Yale University
Chemistry: Gary W. Brudvig
Economics: Philip H. Dybvig
Neuroscience: Robert B. Innis
Rodrigo O. Kuljis
Physics: Michael P. Schmidt

Sloan Dissertation Fellowships $893,331

The Sloan Dissertation Fellowship Program, established in 1984, is designed to assist doctoral candidates in two fields of traditional interest to the Foundation: economics and mathematics. Completing the dissertation is usually a time-consuming scholarly task that is performed with great difficulty amidst the candidate's teaching duties and other obligations. The Sloan awards give the Fellows the freedom they need to finish their degrees.

While it is difficult to evaluate this program after only two full years of operation, all informal reactions from the Fellows' graduate departments have been highly favorable. A large percentage of the Fellows in the first two cohorts either completed the dissertation or made substantial progress toward completion during the fellowship year. Almost all of these former fellows are now employed, many of them as junior faculty at major research universities.

In 1986, awards covering full tuition plus a stipend of $11,000 were made to 25 doctoral candidates in each field. Nominations were solicited from the chairmen of leading graduate departments of economics and mathematics. They were reviewed and final selections made by the following committees:

Economics
Alan J. Auerbach, University of Pennsylvania
Peter A. Diamond, Massachusetts Institute of Technology
Lawrence J. White, New York University

Mathematics
F. Thomas Farrell, Columbia University
Benedict Gross, Harvard University
Robert C. Gunning, Princeton University
Jacob Schwartz, New York University

The following scholars, listed by institution and field, received the 1986 awards:

Brown University
Economics: Seonghwan Oh
Mathematics: Mark W. McConnell
Douglas L. Ulmer

California Institute of Technology
Economics: Jose Edgardo Campos
Mathematics: Askell Hardarson

Carnegie-Mellon University
Economics: Kim Gerald Balls
David A. Marshall

Columbia University
Mathematics: Yakov Karpishpan

Cornell University
Mathematics: Thomas G. Brady

Duke University
Economics: William N. Evans

Harvard University
Economics: Phillippe Aghion
Kiminori Matsuyama
Mathematics: Nigel Boston
Gordan Savin
Carlos T. Simpson

Johns Hopkins University
Mathematics: Masana Harada

Massachusetts Institute of Technology
Economics: Craig Alexander
Alessandra Casella
Bruce Meyer
Mathematics: Angelo Vistoli
Guenter M. Ziegler

New York University
Mathematics: Jingyi Zhu

Northwestern University
Economics: Nicholas Williams III

Princeton University
Economics: John B. Londregan
Janet M. Neelin
Daniel R. Vincent
Mathematics: Bruce Ramsay
Horng-Tzer Yau

Rutgers University
Mathematics: Stefano Olla

Stanford University
Economics: Joseph E. Gagnon
Kenichi Ohno
Mathematics: Jonathan Huntley

University of California, Berkeley
Economics: Stephen R. Blough
Pierre M. Regibeau
Mathematics: Alexander J. Smith
Samuel P. White

University of California, Los Angeles
Mathematics: Zhong-Jin Ruan

University of California, San Diego
Mathematics: Gang Tian

University of Chicago
Economics: Masao Ogaki
Mathematics: Fiona Murnaghan

University of Maryland
Mathematics: Jean-Pierre Garbardo

University of Michigan
Mathematics: Alan B. Brownstein

University of Minnesota
Economics: Guoqiang Tian
Mathematics: Russell M. Brown

University of Pennsylvania
Economics: Paolo A. Fulghieri
Byoung Heon Jun

University of Rochester
Economics: Michele Boldrin

University of Washington
Mathematics: Bernd Sturmfels

Yale University
Economics: Dale R. Ballou
Joon Young Park

New Liberal Arts

Annual reports since 1982 have chronicled the activities undertaken as part of the New Liberal Arts Program. This sixth "particular program" of the Foundation is based on our conviction that a liberal education in the last years of the twentieth century should include some study of the principles and applications of technology, now so pervasive in society. It also should offer students a substantial exposure to quantitative reasoning, computing, and mathematics, all now so important for the analysis of topics and problems encountered in many courses and disciplines throughout the curriculum.

The program began in the spring of 1982 with small planning grants to 30 independent liberal arts colleges. These grants were followed later that year by major awards of $250,000 to 10 of the colleges, and presidential discretionary grants of $25,000 to the other 20 that had taken part in the first round of competition. Since that time, major grants have gone to a small number of universities, to many of the same 20 colleges that received discretionary grants, and to several historically black institutions. In 1985, the first renewal grants were made to colleges that won major awards three years earlier. However encouraged we are by the number of other institutions seriously interested in the program and anxious to enter it, we nevertheless continue the policy of restricting the program to those liberal arts colleges already participating. Our limited resources, we believe, are best used at these colleges in order to develop a body of experience and tested teaching materials to support the goals of the program. The preparation of textbooks and other written materials based on successful new liberal arts courses and suitable for dissemination to interested faculty members, at participating colleges and elsewhere, is now an important priority within the program.

An outside advisory committee of the following persons continued to assist the Foundation in all phases of the New Liberal Arts Program:

Elting E. Morison, Professor Emeritus, Massachusetts Institute of Technology, Chairman of the Committee

David P. Billington, Professor of Civil Engineering, Princeton University

Nannerl O. Keohane, President, Wellesley College

William Kessen, Professor of Psychology, Yale University

C. Dwight Lahr, Dean of the Faculty, Dartmouth College

John G. Truxal, Distinguished Teaching Professor of Engineering and Applied Science, State University of New York, Stony Brook

The press of other duties kept John G. Kemeny, Professor of Mathematics at Dartmouth College, from continuing as a member of the committee. His advice and counsel have served the program well from its beginning. We were pleased to welcome Professor Billington and Dean Lahr, long-standing friends and supporters of the New Liberal Arts Program, as members of the advisory committee starting in 1986.

Trustee Grants in the New Liberal Arts Program

We were aware from the beginning of the New Liberal Arts Program that the educational reform we were inviting colleges to undertake could only succeed if they had the patience and staying power necessary to effect a fundamental change in the undergraduate curriculum. That meant the Foundation, too, had to commit itself for the long term and had to be ready to continue its support of the colleges that entered the program, provided they were making good progress.

Of the ten colleges that won major awards in 1982 in the first round of competition, four received renewal grants at the end of 1985: Carleton, Davidson, Mount Holyoke, and Vassar. Four more came up for renewal consideration in 1986. The Foundation, in cooperation with the presidents of all 10 colleges, had stipulated certain conditions for renewals, including a careful evaluation of the first grant, plans for further faculty development and exposure of students to topics in technology, and a commitment from the colleges to match any renewal dollar-for-dollar. The ceiling on renewal grants was the same as the first grant, $250,000. With the one-to-one match, each college receiving a renewal would thus have a substantial fund, $500,000, with which to move ahead in phase two of the program.

The following colleges, having met these and other conditions, received renewal grants in 1986:

Grinnell College **$250,000**
Grinnell, Iowa 50112

(Project director: Elliott L. Uhlenhopp, Associate Professor of Chemistry; Grant period: July 1986-June 1991.)

Lafayette College **$250,000**
Easton, Pennsylvania 18042

(Project directors: Sarah R. Blanshei, Provost and Dean of the Faculty, and James R. Vitelli, Professor of English; Grant period: July 1986-June 1990.)

Union College **$250,000**
Schenectady, New York 12308

(Project director: William W. Fairchild, Professor of Mathematics; Grant period: July 1986-June 1991.)

Wellesley College **$250,000**
Wellesley, Massachusetts 02181

(Project directors: Susan S. Silbey, Associate Professor of Sociology and James H. Grant, Assistant Professor of Economics; Grant period: July 1986-June 1990.)

During 1984 and 1985, the Foundation made grants of $150,000 to nine of the 20 colleges that had received small presidential awards in the first round of competition in the New Liberal Arts Program. These grants, to colleges that had joined us at the beginning of the program, supported various faculty and curriculum development projects in applied mathematics and technology. Two more such grants were made in 1986:

Claremont University Center **$350,000**
Claremont, California 91711

Claremont McKenna and Pomona were among the colleges invited into the first round of competition for major grants in the New Liberal Arts Program. For this grant, they are joined by their three neighboring colleges: Harvey Mudd, Pitzer, and Scripps. The group of Claremont undergraduate colleges will emphasize clinic-related activities, based on the successful engineering clinics developed at Harvey Mudd and designed to introduce technological methods and concerns into the traditional disciplines. Faculty seminars, development of new courses or modules in technology for liberal arts students, and the consideration of a minor in technology are also part of the colleges' plans. (Project director: Newton Copp, Associate Professor of Biology, Joint Science Department; Grant period: June 1986-August 1989.)

Reed College **$150,000**
Portland, Oregon 97202

Faculty members at Reed will prepare new materials in the history of technology for the core Humanities courses and a handbook on scientific and technological aspects of art conservation. Two symposia, one on technology and the liberal

arts, another on biotechnology, are also planned. (Project directors: John Tomsich, Professor of History and Humanities and Charles S. Rhyne, Professor of Art History; Grant period: May 1986-August 1989.)

Workshops for faculty members have been held each summer since the start of the New Liberal Arts Program. They have been among the most popular and successful activities in the program. The workshop format has allowed college teachers to get sustained exposure for at least a full week, often for two weeks, to experienced and outstanding engineering educators or other specialists, and to work together to develop curriculum materials in technology and applied mathematics.

Grants were approved by the Trustees in 1986 for six workshops — one that was conducted in the summer of 1986 (in addition to two others approved in 1985 and noted in that year's annual report), three to be held in the summer of 1987, and two that are scheduled for January of 1988:

Claremont McKenna College **$56,000**
Claremont, California 91711

This grant includes two related projects: preparation of a reader on the uses of technology in contemporary politics, and a workshop on political technology for faculty members at new liberal arts colleges, to be held in January 1988 at the Rose Institute of State and Local Government. The workshop will give professors of political science an opportunity to study the Rose Institute computing equipment and how it is used, to learn from experts with experience in applying technology to politics, and to consider the possibility of developing computer applications, including simulations of local campaigns and elections, for their own college courses. The political technology reader will be available in draft form as a "text." (Project director: Alan Heslop, Professor of Political Science and Director of the Rose Institute of State and Local Government; Grant period: November 1986-March 1988.)

Dartmouth College **$70,000**
Hanover, New Hampshire 03755

The Foundation made three grants (described in previous annual reports) to Georgia Institute of Technology in support of a consortium of historically black colleges known as Resourceful Exchange: Technology and the Liberal Arts (RETLA). Georgia Tech was the organizational center for RETLA and over a period of three years conducted a valuable program of workshops and consultations in technology, computing, and applied mathematics for faculty members from the RETLA institutions. Having decided late in 1985 to replace this indirect support of new liberal arts activities at historically black colleges by a program of direct grants to those colleges most active in RETLA, the Foundation planned a week-long workshop for twenty-four faculty members, three from each of the eight selected historically black colleges: Albany State, Bennett, Dillard, Morehouse, Morris Brown, Paine, Savannah State, and South Carolina State. The workshop concentrated on mathematics, data analysis, and effective use of computers throughout the curriculum, the very topics on which proposals for 1987 grants were to be subsequently invited from the eight colleges. This grant supported the one-week workshop, held at Dartmouth during June of 1986. (Project director: C. Dwight Lahr, Dean of the Faculty; Grant period: March 1986-July 1986.)

Harvard University **$60,000**
Cambridge, Massachusetts 02138

This workshop, to be conducted at Harvard during the summer of 1987, will bring together sixteen college faculty members, mainly from departments of sociology and political science, for an intensive week-long experience with computer software specially designed for testing hypotheses and analyzing social science data. Materials prepared for the workshop, including a workbook, policy analysis units, and a guide for teachers, will make it possible for participants to introduce a new quantitative methodological emphasis into their own beginning courses in sociology and political science. (Project directors: James A. Davis, Professor of Sociology and Carol Mueller, Lecturer, Committee on Social Studies; Grant period: November 1986-October 1987.)

Princeton University **$100,000**
Princeton, New Jersey 08544

As a result of past Princeton seminars and other activities by Professor Billington and his colleagues, a number of college faculty members have been encouraged to develop and offer new courses, or parts of courses, on topics presented by the Princeton group or modeled on their guiding principles. This grant will support a workshop, to be held during the summer of 1987, for experienced participants who can benefit from and contribute to discussions at an advanced level. Topics to be featured are: Structures and Machines; Technology of Historic Buildings; History of Computing; and Developments in Operations Research. (Project directors: David P. Billington, Professor of Civil Engineering; Michael S. Mahoney, Professor of History of Science; Robert Mark, Professor of Architecture; and John M. Mulvey, Professor of Engineering/Applied Science; Grant period: November 1986-October 1987.)

Research Foundation of the State University of New York — **$86,000**
P. O. Box 9
Albany, New York 12201

This grant will support a workshop on communication technology to be held at Wellesley College in August of 1987. During previous summers, Professor Truxal has directed very successful workshops, each intended to introduce a wide-ranging collection of topics in technology suitable for the liberal arts curriculum. This workshop will focus on a single important technology of interest to a large number of college faculty members with a number of different specialties. Such topics as computer generated speech, automated voice recognition, and satellite communication will be discussed. This grant also includes support for a one-day meeting of project directors from all colleges with major grants in the New Liberal Arts Program, to be held at Wellesley immediately following the workshop. (Project director: John G. Truxal, Professor of Engineering and Applied Science, SUNY-Stony Brook; Grant period: January 1987-December 1987.)

Smithsonian Institution — **$100,000**
Washington, D.C. 20560

This grant will support a workshop to be held in January of 1988 at the Smithsonian's National Air and Space Museum. Workshop lecturers and discussion leaders from the Museum's technical staff will make use of the Smithsonian's unequalled collection of historical aerospace equipment. A videodisc of support materials for a teaching module on the history of flight, based on the workshop program, will be produced as a means of encouraging participating faculty members from new liberal arts colleges to make room in a course of their own for some aspect of aviation history and technology. (Project director: Paul A. Hanle, Associate Director for Research, National Air and Space Museum; Grant period: January 1987-June 1988.)

The computer is an instrument of enormous power for enriching instruction in quantitative reasoning, applied mathematics, and technology. Colleges in the New Liberal Arts Program are therefore naturally interested in the latest computer equipment — not only how it might be acquired but also how, if acquired, it could be used to improve the teaching of faculty and learning of students. Announcement early in 1986 of an agreement between the Foundation and Digital Equation Corporation, under which MicroVAX II computer systems and associated software could be purchased by the colleges at an attractive discount, produced proposals from five colleges. Each planned to purchase

MicroVAX II systems and related materials at a cost averaging over $100,000, to use this equipment for the support of new liberal arts projects, and to make any newly developed software generally available. Foundation supplementary grants of $20,000 to support these special computer-based projects were made to the following colleges. (To allow time for reporting on the use of the newly acquired equipment in the curriculum, the grant period in each case extends from June 1986 to December 1987.)

Bryn Mawr College
Bryn Mawr, Pennsylvania 19010

Grinnell College
Grinnell, Iowa 50112

Union College
Schenectady, New York 12308

Vassar College
Poughkeepsie, New York 12601

Wellesley College
Wellesley, Massachusetts 02181

Princeton University — **$350,000**
Princeton, New Jersey 08544

A 1984 Foundation grant supported a group of four Princeton faculty members (Professors Billington, Mahoney, Mark and Mulvey) in the preparation of an integrated series of studies in engineering for liberal arts students. Their scholarly work, combining visual, historical, biographical, and quantitative techniques and perspectives, has proved to be of great interest to both faculty members and students. This grant will continue support of the Princeton group's work. They plan to complete a number of books on such topics as structures and machines in urban society, form and structure in architecture, the history of computer software, and the application of large-scale computer models in the public sector. They will continue to collaborate with faculty members from colleges active in the New Liberal Arts Program, to test course materials in classes at Princeton and monitor their use in the colleges, and to prepare and make available slides, computer graphics, and other visual materials to accompany their written work. (Project directors: David P. Billington, Professor of Civil Engineering; Michael S. Mahoney, Professor of History of Science; Robert Mark, Professor of Architecture; and John M. Mulvey, Professor of Engineering/Applied Science; Grant period: September 1986-August 1989.)

Research Foundation of the State University of New York — **$160,000**
P. O. Box 9
Albany, New York 12201

Special-leave grants offer partial support for faculty members from colleges in the New Liberal Arts Program to spend an academic year or two summers on full-time curriculum development projects. Their popularity and effectiveness led us to increase the number of such $20,000 grants from four in 1985-86 to eight in 1986-87. The Stony Brook Resource Center for the New Liberal Arts Program serves as administrative agent for this project. Funds for individual grants are awarded to the colleges of the recipients, with no overhead charges at either Stony Brook or the home institutions. Guidelines for the new competition stress the importance at this stage of the New Liberal Arts Program of the production of educational materials suitable for dissemination to other institutions. Eight special-leave awards for 1987-88 are made possible by this grant. (Project director: John G. Truxal, Professor of Engineering and Applied Science, SUNY-Stony Brook; Grant period: January 1987-June 1988.)

Stanford University — **$75,000**
Stanford, California 94305

Early in 1984, a grant was made to Stanford to support the development of a year-long new course on technology, science, and mathematics. James L. Adams (Engineering), Alexander Fetter (Physics), and Robert Osserman (Mathematics) have now prepared the course and will be teaching it for the third time during the academic year 1986-87. A student completing the full course satisfies the Stanford graduation requirement in each of three areas: mathematics, science, and technology. This new grant will support the preparation of two books from the material developed for the course, one on the nature of technology (Adams), the other on mathematics (Osserman). Such books, written by two experienced authors and extremely successful teachers, will be of general interest and will also make significant parts of the Stanford course available to faculty members and students at other colleges and universities. (Project directors: James L. Adams, Chairman, Program in Values, Technology, Science, and Society and Robert Osserman, Professor of Mathematics; Grant period: January 1987-December 1987.)

Officer Grants in the New Liberal Arts Program

Harvard University — **$17,500**
Cambridge, Massachusetts 02138

For the development of data-based materials for quantitative introductory sociology. (Project directors: Carol Mueller, Lecturer in Social Studies, and James A. Davis, Professor of Sociology; Grant period: March 1986-February 1987.)

Massachusetts Institute of Technology — **$1,877**
Cambridge, Massachusetts 02139

To cover supplementary costs of the 1985 biotechnology workshop. (Grant period: February 1986-August 1986.)

New York University — **$20,000**
New York, New York 10003

Support for the preparation of a monograph and other curriculum materials on applied game theory. (Project director: Steven J. Brams, Professor of Politics; Grant period: September 1986-August 1987.)

Stanford University — **$30,000**
Stanford, California 94305

For support of a West Coast conference on the New Liberal Arts Program. (Project director: James L. Adams, Chairman, Program in Values, Technology, Science, and Society; Grant period: March 1986-September 1986.)

Stevens Institute of Technology — **$30,000**
Hoboken, New Jersey 07030

To complete an introductory book on information technology for liberal arts students. (Project director: Edward A. Friedman, Professor of Management and Consultant to the Institute on Academic Computing; Grant period: September 1986-June 1987.)

Public Management

Improving public services and the management of government have been important interests of the Foundation since the mid-1970's. At the outset, our grants helped reshape the curriculum of many of the major professional and undergraduate schools in the field. The new curriculum took account of the rapid developments in a number of fields — economics, applied mathematics, computer science — that required a drastic change in the education of the designers and managers of public policy. After 1980, the curriculum goals having been substantially achieved, we concentrated on supporting the development of a strong research base in public management which would assist both practitioners in public service and scholars of the field. At the same time we began a systematic effort, in cooperation with the Association for Public Policy Analysis and Management (APPAM), to increase the flow of minority students into the high-quality programs we had helped establish.

By 1984, the minorities project had become so substantial that it was designated a "particular program" (see Policies and Procedures for a description of our particular programs). The proportion of our expenditures aimed at increasing the number of minorities in important public sector careers has steadily increased. Today, in substantial part because of our efforts, there are significant numbers of minority students in the major schools of public policy and management.

Particular Program for Minorities in Public Management

Post-Junior Year Summer Institutes **$868,000**

This is the seventh year of the Foundation's support for summer institutes for minority students between their junior and senior years in college. Our aim is to increase the number of minority students in graduate programs in public policy and management, as a step toward increasing the number of minorities in significant public sector careers. The institutes, jointly developed by APPAM and the Foundation, are eight-week residential programs of intensive study of management, economics, statistics, computing, and communication skills. As part of each institute, successful minority public managers are invited to discuss their careers with the students. For the first time this year, each student attending an institute will be provided a summer stipend of $1,000. Eight grants of $108,500 were made to support 1986 post-junior year institutes for a total of 225 students, at the following APPAM schools:

Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213
(Project director: Ann R. Edwards, Director of Summer Studies, School of Urban and Public Affairs.)

Princeton University
Princeton, New Jersey 08544
(Project director: T. James Trussell, Professor of Economics and Public Affairs.)

State University of New York, Stony Brook
Stony Brook, New York 11794
(Project director: Harry Weiner, Professor of Policy Analysis and Public Management.)

University of California, Berkeley
Berkeley, California 94720
(Project director: Phyllis Strong Green, Associate Dean of the Graduate School of Public Policy.)

University of Michigan
Ann Arbor, Michigan 48109
(Project director: Paul N. Courant, Director of the Institute of Public Policy Studies.)

University of Minnesota
Minneapolis, Minnesota 55455
(Project director: John Brandl, Professor of Public Affairs and Planning.)

University of Texas, Austin
Austin, Texas 78712
(Project director: Max Sherman, Dean of the Lyndon B. Johnson School of Public Affairs.)

University of Washington
Seattle, Washington 98195
(Project director: Hubert Locke, Dean of the Graduate School of Public Affairs.)

Post-Senior Year Summer Institutes **$357,000**

These intensive eight-week summer programs are restricted to students of high promise who have successfully completed one of the post-junior year institutes and who have been accepted by an APPAM school for enrollment in a graduate program the following fall. The subjects studied are again economics, mathematics, computing, and communication skills. APPAM minority students now in graduate school are emphatic in crediting the summer institutes with making it possible for them to compete in high-quality graduate programs. The two post-senior year institutes in 1986 were held, as in previous years, at Harvard ($252,000 grant for 60 students) and at the Rand Corporation ($105,000 grant for 18 students):

Harvard University
Cambridge, Massachusetts 02138
(Project director: Ronald F. Ferguson, Associate Professor, John F. Kennedy School of Government.)

Rand Corporation
1700 Main Street
Santa Monica, California 90406
(Project director: Charles Wolf, Jr., Dean of the Rand Graduate School.)

Duke University **$1,350,000**
Durham, North Carolina 27706

The third component of our particular program for minorities in public management is fellowship support for those students who successfuly complete one of the post-senior year summer institutes and enroll in an APPAM graduate program. The Foundation meets the cost of their first year of graduate school. In the student's second year (almost all are in two-year Master's programs) support is provided by the graduate institution. In 1986, the sixth year for this fellowship program, there were 103 fellows enrolled in 19 APPAM graduate programs. As in past years, this grant was administered by Duke University on behalf of the participating APPAM schools. (Project director: Robert D. Behn, Professor, Institute of Policy Sciences and Public Affairs; Grant period: July 1986-August 1987.)

Other Trustee Grants in Public Management

Harvard University **$166,500**
Cambridge, Massachusetts 02138

Starting in the mid 1970's, the work of James Q. Wilson and his graduate students at Harvard has supplied detailed accounts of how government agencies defined their central tasks of implementing policy and what they actually did in coping with legislative mandates to "do something." With Foundation support, graduate students spent time in Washington studying federal agencies—a kind of summer internship in methods of field research in bureaucratic behavior. Doctoral dissertations were written. At the same time, Professor Wilson was pursuing his own research interest in related areas of public management, chiefly law enforcement and economic regulation. It is now proposed to synthesize the research materials and insights developed in this decade-long effort into a comprehensive book, intended for a general audience, on the nature and problems of bureaucracy in American government. This grant supports continued research and the preparation of such a book. (Project director: James Q. Wilson, Professor, Graduate School of Management, University of California, Los Angeles; Grant period: February 1986-February 1989.)

National Assembly of National Voluntary Health and Social Welfare Organizations, Inc. **$60,000**
1319 F Street, NW
Washington, D. C. 20004

The United Way of America includes a group called The Top Seventeen, composed of chief executives of the largest national voluntary organizations. This group has decided to launch a study of excellent management in non-profit organizations. The National Assembly was asked and agreed to serve as headquarters for the project. This study will focus on human services agencies and seek to identify the characteristics of excellent executives and to highlight those factors which are unique to the management of voluntary organizations. (Project director: Leonard W. Stern, Executive Director; Grant period: April 1986-April 1987.)

National Conference on Social Welfare **$95,000**
1730 M Street, NW
Washington, D.C. 20036

Two previous grants supported the work of the Commission on Federalism and National Purpose under the auspices of the National Conference on Social

Welfare. This bipartisan commission included a number of outstanding scholars and elected officials and was superbly led by its co-chairmen, Governor Charles Robb of Virginia and Senator Daniel Evans of Washington. The Commission studied an important and complex problem of public management: the relative efficiency of public and private services and the most appropriate level of government—federal, state, or local—for the carrying out of various programs and responsibilities. The Commission's final report makes a number of proposals for significant changes in the inter-governmental system. This supplementary grant will support legal work of producing a draft bill for congressional consideration, financial analysis of Commission proposals, and some additional Commission staff work. (Project director: Alan Pifer, President Emeritus of the Carnegie Corporation of New York; Grant period: April 1986-April 1987.)

University of Maryland **$94,000**
College Park, Maryland 20742

The curriculum of graduate programs that prepare students for managerial careers in government has changed in many ways over the past decade or so. Economics, statistics, mathematical modeling, and computer simulation are now included in virtually all such programs. But some important gaps remain. Graduates, many of whom are now in important positions, recommend especially that students should learn more about business-government relations and about public sector financial management. This grant, aimed at the second of these areas, will support the development of course materials and the demonstration of their use in the classroom. (Project director: George Eads, Dean, School of Public Affairs; Grant period: May 1986-April 1988.)

Officer Grants in Public Management

Brookings Institution **$25,000**
1775 Massachusetts Avenue, NW
Washington, D.C. 20036

For partial support of a conference on "A Public Service for the Year 2000." (Project director: Bruce K. MacLaury, President; Grant period: January 1986-January 1987.)

Fund for the City of New York **$15,000**
419 Park Avenue South
New York, New York 10016

For support of the Public Service Award Program. (Project director: Gregory Farrell, Executive Director; Grant period: December 1986-June 1990.)

Harvard University **$20,000**
Cambridge, Massachusetts 02138

For partial support of a conference on The Cities. (Project director: Arnold M. Howitt, Associate Director, State, Local, and Intergovernmental Center, John F. Kennedy School of Government; Grant period: September 1986-December 1987.)

Manpower Demonstration Research Corporation **$25,000**
Three Park Avenue
New York, New York 10016

For support of the Advisory Committee to MDRC's Demonstration of State Work/Welfare Initiatives for the final period of the project. (Project director: Barbara B. Blum, President; Grant period: June 1986-June 1987.)

New York City Partnership Foundation, Inc. **$19,000**
200 Madison Avenue
New York, New York 10016

For support of a conference on government-business cooperation in dealing with urban problems. (Project director: Edward S. Cabot, Executive Vice President; Grant period: May 1986-December 1986.)

Tufts University **$5,000**
Medford, Massachusetts 02155

For a public policy symposium on political violence and international terrorism. (Project director: Sherman Teichman, Professor of Political Science, The Experimental College; Grant period: February 1986-June 1986.)

University of Rochester **$19,000**
Rochester, New York 14627

To support the April 1987 meeting of the Carnegie-Rochester Conference on Public Policy. (Project director: Karl Brunner, Director, Center for Research in Government Policy and Business in the Graduate School of Management; Grant period: November 1986-June 1987.)

University of San Francisco **$30,000**
San Francisco, California 94117

For support of a national conference on Graduate Education for Nonprofit Organization Managers. (Project director: Michael O'Neill, Director, Institute for Nonprofit Organization Management, College of Professional Studies; Grant period: January 1986-December 1986.)

Vanderbilt University **$18,000**
Nashville, Tennessee 37235

Support for a project on "impossible jobs" in the public sector. (Project director: Erwin C. Hargrove, Professor of Political Science; Grant period: May 1986-May 1987.)

Public Understanding of Science

To advance the public understanding of science and technology has been a continuing interest of the Foundation. The role of scientists and engineers in our society, already substantial, is growing. Their ability to communicate effectively with the general public, directly or through intermediaries, is of crucial importance for democratic decision-making. As part of almost all Foundation programs, grants are made to support one activity or another designed to promote such communication and the hoped-for increased public understanding of the methods and results of science and technology. They are described under the appropriate headings throughout this report. For example, the New Liberal Arts Program addresses a special public — faculty members and students at undergraduate liberal arts colleges—and aims to increase their contact with and understanding of technology. Much of our activity under the heading of arms control and defense policy, also described elsewhere in this report, has a primarily educational purpose in assisting college teachers and students to understand the difficult issues involved in nuclear weaponry and strategic issues of defense. Some grants to support the preparation of museum exhibits, books and other materials, described as part of the Cognitive Science Program, are also intended mainly to increase the public's understanding of this relatively new field of science.

Here we report on the Science Book Program and describe a miscellaneous group of trustee and officer grants, all in one way or another concerned with improving communication and understanding of science and technology.

Science Book Program

Under this program, initiated in 1975, the Foundation invites outstanding scientists to write about the nature of their experiences and the character of their lives in science. Authors are encouraged to write in such a way as to make the intimate experience of doing scientific work less mysterious to non-scientists and to give laymen a better sense of what a life is like when it is dedicated to science.

Seven books have already appeared in the series:

In Search of Mind by Jerome Bruner;

Haphazard Reality by Hendrik B. G. Casimir;

Disturbing the Universe by Freeman Dyson;

A Slot Machine, A Broken Test Tube by S. E. Luria;

Advice to a Young Scientist by P. B. Medawar;

The Youngest Science by Lewis Thomas;

Enigmas of Chance by Marc Kac.

In 1986, three additional books were approved and scheduled for publication in 1987: *Rabi: Scientist and Citizen* by John Rigden; *Alvarez: Adventures of a Physicist* by Luis Alvarez; *Making Weapons, Talking Peace: A Physicist's Odyssey from Hiroshima to Geneva* by Herbert York.

In all aspects of this book program, the Foundation was ably assisted during 1986 by an advisory committee of distinguished members:

Robert Sinsheimer, Chancellor of the University of California, Santa Cruz, Chairman of the Committee

Michael Bessie, Publisher, Cornelia & Michael Bessie Books

Howard H. Hiatt, Professor of Medicine, Harvard Medical School and Harvard School of Public Health

Eric Kandel, University Professor of Physiology and Psychology, Columbia University

Daniel Kevles, Professor of History, California Institute of Technology

Robert Merton, University Professor Emeritus and Special Service Professor, Columbia University

Paul Samuelson, Institute Professor of Economics, Massachusetts Institute of Technology

Stephen Weinberg, Josey Regental Professor of Science, University of Texas

Stephen White, foundation officer (retired), writer.

Trustee Grants in Public Understanding of Science

Massachusetts Institute of Technology **$250,000**
Cambridge, Massachusetts 02139

With support of the Sloan and Mellon Foundations, the Vannevar Bush Fellowships in the Public Understanding of Technology and Science were established

at MIT in 1983. Journalists with some experience or a serious interest in writing for a general audience about science and engineering are brought to MIT for a year-long program. They not only learn about current developments in science and technology, but also make contacts that will help their newsgathering and reporting. The program is working well—cooperation of MIT faculty has been excellent, former Fellows are enthusiastic about their experiences at MIT, and their employers are supportive. This fourth and final annual grant will provide support for another group of fellows and for many activities of the program. (Project director: Victor K. McElheny, Program in Science, Technology and Society; Grant period: June 1986-June 1987.)

Medical and Health Research Association of New York City, Inc. **$150,000**
40 Worth Street
New York, New York 10013

This civic grant is providing the start-up costs for a new annual Health of the City report, to be prepared under the supervision of the Commissioner of Health of New York City. This report will be a quite novel enterprise, embodying a strong emphasis upon health promotion and disease prevention, and produced in a form readily accessible to the non-technical reader. The report will be drafted by a professional health writer and will incorporate data in the form of readable computer-generated graphics. A special abridged version will be produced for use by the press and the public. An outside editorial advisory board has been appointed to assure balanced and broad coverage of important health issues. Each report will include in-depth analyses of selected public health topics that have special significance for New York City. Examples include AIDS, infant mortality, teenage pregnancy, the homeless, smoking-related illness, and product tampering and recall. (Project director: Stephen C. Joseph, M.D., Commissioner of Health; Grant period: December 1986-November 1988.)

New York Hall of Science **$100,000**
47-01 111th Street
Corona, New York 11368

The New York Hall of Science is a non-profit science and technology center presenting hands-on exhibitions and educational programs for the public. In operation since 1964 and closed for extensive renovation in 1981, it reopened with an outstanding new staff in 1986. Exhibits on Light, Vision and Perception, the Quantum Atom, Robots, Medical Imaging, and Sound Sculptures make the Hall of Science one of the important cultural and educational institutions in New York City. This civic grant supports the development of a new exhibit on Feed-

back, a fundamental control principle essential for the proper performance of engineering, economic, social and biological systems. (Project director: Alan J. Friedman, Director; Grant period: April 1986 - April 1987.)

Smithsonian Institution **$131,000**
Washington, D.C. 20560

Beginning in 1981, Foundation grants supported a collection of projects in video-history, each an extended videotaped conversation, guided by a moderator, among persons who shared important events in public affairs or scientific developments. Many historians and other scholars and teachers have attested to the value of this material for historical research and education. We viewed these projects as experiments which, if successful in establishing the validity of the mode, would form the foundation of a long-term program in video-history at another institution. This grant supplies start-up support for the Smithsonian Institution in a major undertaking to employ video-history as an important component in its continuing efforts to document the character of science and technology and their impact on our times. Additional grants over the next three years are contemplated based on a review of progress as the project develops. The Smithsonian plans to employ the special historiographical capability of video technology in studies of such issues as public and private patronage in science; the origin and roles of "think tanks" and laboratories in universities, industries, and government agencies; the formation of national laboratories; the origin and development of such organizations as the National Science Foundation and the National Aeronautics and Space Administration; and the role of scientists as advisors to industry, the military, and government. (Project director: David H. DeVorkin, National Air and Space Museum: Grant period: June 1986-December 1987.)

Officer Grants in Public Understanding of Science

American Association for the Advancement of Science **$25,000**
1333 H Street, NW
Washington, D.C. 20005

Partial support for a conference on ethical misconduct in science. (Project director: William D. Carey, Executive Officer; Grant period: November 1986-December 1987.)

Harvard University **$10,000**
Cambridge, Massachusetts 02138

Support for a Harvard Medical School conference on science and journalism. (Project director: Jonathan R. Beckwith, Professor of Microbiology and Molecular Genetics; Grant period: February 1986-May 1986.)

Harvard University **$30,000**
Cambridge, Massachusetts 02138

For support of a book entitled "Lise Meitner: A Portrait in Letters." (Project director: Erwin Hiebert, Professor of The History of Science; Grant period: December 1986-December 1988.)

New School for Social Research **$20,000**
66 West 12th Street
New York, New York 10011

To complete a book on the influence of culture on technological development. (Project director: Leon Festinger, Professor of Psychology; Grant period: February 1986-December 1987.)

University of Missouri-St. Louis **$29,750**
St. Louis, Missouri 63121

For writing a book featuring the hydrogen atom and its many roles in modern physics, intended for the general reader. (Project director: John S. Rigden, Professor of Physics; Grant period: August 1986-December 1988.)

Science, Technology, and Mathematics

The costs of research in mainstream science and engineering, two fields of traditional interest to the Foundation, are now well beyond our financial range and have become the responsibility of government, industry, and the research institutions themselves. Our main support of science and mathematics continues to be under the particular program in cognitive science, in the research and doctoral dissertation fellowship programs, and for projects involving public policy or public understanding rather than fundamental research.

In engineering, almost all our support is within the New Liberal Arts Program. Instruction in technology and the principles of engineering for undergraduate liberal arts students is a central part of that program. It involves a dozen or so engineering educators who see the importance of making technology less mysterious to the general public, and who are themselves devoting some part of their professional careers to the development of courses and materials on various technological topics suitable for liberal arts students.

In this section we bring together and give background information on a number of 1986 grants falling mainly into three areas: molecular studies in evolution; population sciences; and symbolic computation in undergraduate mathematics. As is to be expected, there are both trustee and officer grants that do not fit under these headings, but also support various projects in science, technology, or mathematics. All of these are listed and described below.

Molecular Studies in Evolution

While basic scientific research is the wellspring of technological advance, newly developed technologies may in turn revolutionize basic science. Such a possibility has now arisen in the study of evolution, which has played such a central role in biology since the time of Charles Darwin. For the first time, the powerful techniques of molecular biology are making it possible to unravel the millions of years of evolutionary history that are encoded in the genetic complement of living species. Evolutionary biology need no longer rely solely upon the incomplete fossil record and the often hard-to-interpret evidence from morphological comparisons. Each of these well-established approaches continues to have its own special strengths, but both can now be checked against wholly new scientific evidence arising from the rapidly developing methods of molecular biology.

Despite its scientific potential, the scale of molecular-level research on evolution remains quite small. This is due in part to its cross-disciplinary nature,

requiring advanced knowledge of both molecular and evolutionary biology, and in part to the sparseness of available research funding. Four trustee grants and one officer grant in molecular evolution were described in last year's Annual Report. Although only three additional grants were authorized in 1986, the Foundation's interest in this area remains high. In fact, looking to future years, the Board of Trustees approved a new initiative aimed at stimulating an increased level of research activity in molecular evolution.

A Trustee Grant in Molecular Evolution

University of California, Los Angeles **$92,500**
Los Angeles, California 90024

This grant supports the convening in early 1987 of an International School on Molecular Evolution. Twenty outstanding young molecular biologists, at the advanced graduate or postdoctoral levels, will be offered an intensive set of lectures, laboratory experiences, and computer analyses provided by leading scientists in molecular evolution and focused upon important questions in evolutionary biology. The project's goal is to bring the study of evolution into the mainstream of research among younger molecular biologists. (Project director: James A. Lake, Professor of Biology; Grant period: April 1986-December 1988.)

Officer Grants in Molecular Evolution

California Institute of Technology **$30,000**
Pasadena, California 91125

For research on the evolution of the cellular immune system. (Project director: Eric H. Davidson, Professor of Cell Biology; Grant period: September 1986-March 1987.)

Dana-Farber Cancer Institute **$20,000**
44 Binney Street
Boston, Massachusetts 02115

For partial support of an international symposium on "MacroMolecules, Genes, and Computers." (Project director: Temple F. Smith, Director, Molecular Biology Computer Research Resource; Grant period: July 1986-December 1986.)

Population Sciences

Since 1985, the Foundation has sought to encourage scientific interest in cross-disciplinary population sciences. This initiative was based upon the realization that there was much parallel work but often only limited communication among the numerous disciplines in which population-level analysis is undertaken, including demography, ecology, economics, epidemiology, genetics, mathematics, and population biology. In these disciplines, quantitative techniques of various kinds are applied to the study of animal, human, plant, and microorganism populations. Believing that much could be gained from joint work involving these separate scientific approaches, we made grants to seven universities in 1985: a major award to support ongoing research at Stanford University, where an interdisciplinary Committee on Population Studies had already been established, and smaller grants to six other institutions, where cross-disciplinary activities had not yet begun, for various exploratory projects designed to encourage collaborative faculty research in the population sciences. It was anticipated that several of these might lead to more substantial research proposals. One such project, at Berkeley, did indeed lead to a trustee grant in 1986. Other smaller projects, involving various activities in the population sciences, were supported with officer grants.

A Trustee Grant in Population Sciences

University of California, Berkeley **$200,000**
Berkeley, California 94720

With our 1985 grant to encourage cross-disciplinary research in the population sciences, faculty members at Berkeley undertook a one-year exploration involving a well-attended research seminar, a working paper series, and a selected set of visiting scientists. From this exploration emerged a new community of interest among population biologists in the Departments of Entomology and Biological Control, mathematicians and demographers in the Graduate Group in Demography, and members of the Anthropology Department. This grant will support a series of five research projects by members of this new group, focused upon non-linear population models in biology and demography. Topics include: analysis of period, amplitude and waveform for sustained waves derived from renewal equations and Lotka-Volterra systems; evaluation of state-structured harvesting and human labor force feedback models; and explorations of the population cycles generated by marriage and mating models involving intergroup competition. (Project directors: Kenneth W. Wachter, Professor of Demography and Statistics, and Wayne Getz, Associate Biomathematician, Division of Biological Control; Grant period: July 1986-August 1988.)

Officer Grants in Population Sciences

East-West Center **$19,000**
1777 East-West Road
Honolulu, Hawaii 96848

For supplementary support of the ongoing research project, "New Asian Immigrants to the United States." (Project director: James T. Fawcett, Research Associate; Grant period: June 1986-May 1987.)

Georgetown University **$20,000**
Washington, D.C. 20057

For preparation of a book entitled *Reluctant Promised Lands: International Migration and Advanced Industrial Societies*. (Project director: Demetrios G. Papademetriou, Research Associate, Center for Immigration Policy and Refugee Assistance; Grant period: July 1986-June 1987.)

National Opinion Research Center **$20,000**
6030 South Ellis Avenue
Chicago, Illinois 60637

Partial support for a survey of the children of the women in the National Longitudinal Survey of Youth. (Project director: Robert T. Michael, Director; Grant period: January 1986-December 1986.)

New School for Social Research **$9,900**
66 West 12th Street
New York, New York 10011

For a French-American research conference on "New Directions in Historical Demography." (Project director: Charles Tilly, Professor of Sociology and History; Grant period: March 1986-August 1987.)

Population Reference Bureau **$29,800**
777 14th Street, NW
Washington, D.C. 20005

For research on stable population theory as it applies to migration from high- to low-fertility settings. (Project director: Leon F. Bouvier, Vice President; Grant period: July 1986-December 1987.)

Princeton University **$25,000**
Princeton, New Jersey 08544

For support of a one-year program in cross-disciplinary population sciences. (Project directors: Robert May, Professor of Zoology, and Jane Menken, Professor of Sociology and Public Affairs; Grant period: September 1986-August, 1987.)

Statue of Liberty-Ellis Island Foundation, Inc. **$30,000**
101 Park Avenue
New York, New York 10178

For support of a conference on Immigration History and Policy. (Project director: Rudolph Vecoli, Professor of History, University of Minnesota; Grant period: July 1986-December 1986.)

Symbolic Computation in Undergraduate Mathematics

Computer algorithms for many of the standard operations of algebra and calculus are now available. Polynomials can be factored, functions can be differentiated, integrated, and expanded in power series, differential equations can be solved on the computer. Combined with software for graphing and numerical analysis, symbolic computation systems are extremely powerful analytical tools. Originally supported only on large and expensive computers, they now work effectively on personal computers. Hand-held devices to do algebra and calculus are already available, just as there are hand-held calculators to do arithmetic.

Now mainly used as research tools, symbolic computation systems are soon likely to have a significant impact on the teaching of undergraduate mathematics, science, and engineering. New course materials for teachers and students and experimentation in the classroom are needed, as are modifications of the various symbolic computation systems themselves to make them more easily accessible and useful to beginners. The eight grants that follow support pilot projects to begin meeting these needs and to investigate how symbolic computation systems can be used effectively in the teaching of undergraduate mathematics, especially first-year calculus. The University of Hawaii's project continues their work with the symbolic computation system known as muMATH; the seven others involve MAPLE, the system developed and used in the instructional program at the University of Waterloo. Each institution's project involves faculty members who are experienced teachers of calculus, who see the importance and potential of symbolic computation systems for improving the beginning calculus course, and who are interested in developing new course materials and otherwise experimenting with the use of these systems in their teaching. (The grant period in each case is January 1987-August 1988.)

Colby College **$25,000**
Waterville, Maine 04901

(Project director: Donald B. Small, Professor of Mathematics.)

Denison University **$25,000**
Granville, Ohio 43023

(Project director: Zaven A. Karian, Professor of Mathematical Sciences.)

Harvey Mudd College **$25,000**
Claremont, California 91711

(Project director: Robert Borelli, Professor of Mathematics.)

Oberlin College **$25,000**
Oberlin, Ohio 44074

(Project directors: George H. Andrews and Michael Henle, Professors of Mathematics.)

Rollins College **$20,000**
Winter Park, Florida 32789

(Project director: J. Douglas Child, Professor of Mathematical Sciences.)

University of Hawaii at Manoa **$40,000**
Honolulu, Hawaii 96822

(Project director: David A. Stegenga, Professor of Mathematics.)

University of Saskatchewan **$25,000**
Saskatoon, Canada S7N 0W0

(Project director: John Stanley Devitt, Professor of Mathematics.)

University of Waterloo **$75,000**
Waterloo, Ontario N2L 3G1

(Project director: Peter James Ponzo, Professor of Mathematics.)

Other Trustee Grants in Science, Technology, and Mathematics

American Council of Learned Societies **$100,000**
228 East 45th Street
New York, New York 10017

In 1983, the Foundation made an officer grant of $20,000 to the American Council of Learned Societies to help support the editorial preparation of the correspondence of Charles Darwin for definitive publication in a series of volumes. Our relatively small contribution to this massive editorial project came at a pivotal time in the project's history, enabling the ACLS to match an outstanding challenge grant from the National Endowment for the Humanities and permitting the publication of the first volume of letters to proceed on schedule. This volume, containing letters written to and from the young Darwin beginning when he was thirteen and running up to his return from the epic voyage of the Beagle when he was twenty-eight, has now been published. Critical acclaim for the first volume made clear how important this project is for the history of biology and led the Foundation to make a more substantial grant in partial support of the editorial work on subsequent volumes. (Project director: Frederick Burkhardt, Senior Editor; Grant period: May 1986-April 1989.)

National Academy of Sciences **$500,000**
2101 Constitution Avenue
Washington, D.C. 20418

In 1984, the Foundation made a two-year grant of $454,000 to the National Academy of Sciences to help create a government-university-industry Research Roundtable. The purpose of this new institution was to establish a forum at the highest levels for the continuing discussion and possible remediation of problems arising among all parties involved in the national research effort. Under the leadership of Dale Corson, the former President of Cornell University, the Research Roundtable has organized a 20-member council, which includes the Directors of the National Institutes of Health and the National Science Foundation, the Under Secretary of Defense for Research and Engineering, the Director of the U.S. Office of Energy Research, the Presidents of the National Academies of Science and Engineering and the Institute of Medicine, as well as the leaders of a number of major research universities and large corporations with heavy research involvement. This group has become an extremely effective body for reviewing the difficult issues which now face the national research

community. In addition to the Council, the Research Roundtable includes working groups concentrating on three particular problem areas in some depth — government-university relationships in sponsored research, strategies for financing academic research facilities, and alliances between universities and other sectors. After two years of operation, the Research Roundtable has gotten off to a very successful start. Accordingly, the Foundation has made a renewal grant for two years of continued operation. (Project director: Don I. Phillips, Executive Director of the Government-University-Industry Research Roundtable; Grant period: May 1986-April 1988.)

Stanford University **$320,000**
Stanford, California 94305

Stanford has established a Center for Technological Risk Analysis within its School of Engineering to solicit and support research projects in various aspects of risk analysis and to help integrate this subject into the curriculum. In addition to three distinguished members of the engineering faculty, the Center's executive committee includes Kenneth J. Arrow, Nobel laureate and professor of economics, and Donald Kennedy, President of Stanford, professor of biology and former commissioner, Food and Drug Administration. The Center plans to organize an interdisciplinary program in risk management, with a wide-ranging set of research projects of interest to faculty and graduate students from all divisions of the University. This grant will supply start-up funds for these research projects, it being understood that further support for promising long-term projects would be sought from industry or government sources. (Project director: Gerald J. Lieberman, Professor of Operations Research and Statistics; Grant period: January 1987-December 1988.)

Other Officer Grants in Science, Technology, and Mathematics

American Statistical Association **$20,000**
806 15th Street, NW
Washington, D.C. 20005

Partial support of an international conference and edited monograph on Telephone Survey Methodology. (Project director: Robert Groves, Associate Professor of Sociology, Survey Research Center, The University of Michigan; Grant period: November 1986-June 1988.)

Bowdoin College **$29,600**
Brunswick, Maine 04011

For a summer teacher training institute on microscale techniques in undergraduate organic chemistry. (Project director: Dana W. Mayo, Professor of Chemistry; Grant period: March 1986-December 1986.)

Brown University **$20,000**
Providence, Rhode Island 02912

For preparation of a book on the future of mathematical education. (Project director: Philip J. Davis, Professor of Applied Mathematics; Grant period: December 1986-June 1989.)

Columbia University **$6,200**
New York, New York 10027

For a symposium on non-conservation of parity, on the occasion of Professor T. D. Lee's sixtieth birthday. (Project director: Robert Novick, Chairman, Department of Physics; Grant period: January 1986-December 1986.)

Gordon Research Conferences **$10,000**
University of Rhode Island
Kingston, Rhode Island 02881

Partial support for the 1986 Gordon Research Conference on theoretical biology and biomathematics. (Project director: John M. Rinzel, Department of Health and Human Services, National Institutes of Health; Grant period: March 1986-December 1986.)

Other Trustee and Officer Grants

Some grants neither quite fit into any specific program of the Foundation, nor support research or activities in any single academic field within our domain. These are brought together in this section.

Trustee Grants in Arms Control and Defense Policy

The Foundation's role in arms control and defense policy is carefully delimited. It includes only support for various programs designed in one way or another to help teachers deal effectively with the growing interest of undergraduates in systematic instruction on issues of the nuclear age. Courses and seminars on arms control and defense policy are now commonplace at colleges and universities. Yet many of these relatively new instructional programs are led by faculty members who have had little opportunity to master this difficult and complex subject, and who are anxious to deepen their understanding of the technology of nuclear weapons and the history of arms control.

Starting in 1983, we have made annual grants to MIT for two-week summer workshops on issues of the nuclear age for faculty members from colleges and universities. In 1984, a second such workshop was organized in San Diego, mainly for participants from the West. Since few faculty members from the southern states attended these summer workshops, a third intensive one-week workshop held in Miami early in 1986 was funded last year. Evaluations of all these workshops have been very positive. The following grants will allow this workshop program to go forward during the summers of 1986 and 1987 in Cambridge and San Diego and during the winter of 1986-87 in Miami.

Massachusetts Institute of Technology **$395,000**
Cambridge, Massachusetts 02139

(Project director: Jack Ruina, Professor of Electrical Engineering and Director of the Defense and Arms Control Studies Program; Grant period: April 1986-December 1987.)

University of California, San Diego **$280,000**
La Jolla, California 92093

(Project director: Herbert F. York, Director of the Institute on Global Conflict and Cooperation; Grant period: April 1986-December 1987.)

University of Miami **$103,000**
Coral Gables, Florida 33124

(Project director: Behram N. Kursunoglu, Director of the Center for Theoretical Studies; Grant period: April 1986-April 1987.)

Officer Grants in Arms Control and Defense Policy

American Academy of Arts and Sciences **$20,000**
Norton's Woods, 136 Irving Street
Cambridge, Massachusetts 02138

For support of the Kistiakowsky Visiting Scholar program. (Project director: Frank A. Long, Chairman, Committee on International Security Studies; Grant period: February 1986-June 1987.)

American Institute of Physics **$30,000**
335 East 45th Street
New York, New York 10017

For a study of American and European physicists in policy-making, 1945-1970. (Project director: Finn Aaserud, Associate Historian at the Center for History of Physics; Grant period: April 1986-April 1988.)

Arms Control Association **$20,000**
11 Dupont Circle, NW
Washington, D.C. 20036

For support of the Herbert Scoville, Jr., Visiting Lectureship Program. (Project director: Spurgeon M. Keeny, Jr., President and Executive Director; Grant period: January 1986-August 1987.)

Committee for National Security **$25,000**
2000 P Street, NW
Washington, D.C. 20036

For study of defense choices and the military budget. (Project director: Anne H. Cahn, Director; April 1986-December 1987.)

Georgetown University **$30,000**
Washington, D.C. 20057

For support of a third edition of the *International Security Yearbook*, sponsored by the Center for Strategic and International Studies. (Project directors: Barry M. Blechman and Edward N. Luttwak, Senior Fellows, CSIS; Grant period: August 1986-December 1987.)

Hampshire College **$10,000**
Amherst, Massachusetts 01002

For support of a regional consortium on Peace and World Security Studies. (Project director: Harmon C. Dunathan, Dean of Faculty; Grant period: June 1986-June 1987.)

Harvard University **$25,000**
Cambridge, Massachusetts 02138

For support of a conference of scholars and former policymakers to discuss the Cuban Missile Crisis. (Project director: James G. Blight, Research Fellow and Director of the Project on Avoiding Nuclear War; Grant period: December 1986-December 1987.)

National Academy of Sciences **$20,000**
2101 Constitution Avenue
Washington, D.C. 20418

For support of the Academy's Committee on International Security and Arms Control for an initial exploratory meeting with European scientists. (Project director: Victor Rabinowich, Executive Director, Office of International Affairs; Grant period: March 1986-August 1986.)

Trustee Grants for Miscellaneous Purposes

Brooklyn Law School **$79,500**
250 Joralemon Street
Brooklyn, New York 11201

American divorce law has changed dramatically in recent years. "No fault" divorce is now commonplace and substantial changes have been made in the

rules governing the allocation of a couple's income and property. "Equitable" distribution, an innovation that permits judges to distribute marital property in accordance with their perception of the equities of the case, has been introduced in most states; alimony, the traditional method of providing for the divorced wife's needs, has been relegated to a lesser role. Use of these newer laws has not been accompanied by research that explicates how they have affected the decisions of the divorce court or, more important, how they have affected the economic well-being of individual family members. This grant will support a research project on these important issues. Using 1978 and 1984 data from interviews and court records, the analysis will involve comparison of awards before and after the equitable distribution laws, elucidating the changes in property distribution, alimony, and child support, and the way judges and lawyers are using new statutes. (Project director: Marsha Garrison, Associate Professor of Law; Grant period: June 1986-June 1987.)

University of Chicago **$100,000**
Chicago, Illinois 60637

Secretary of State George P. Shultz was Dean of the Graduate School of Business at the University of Chicago from 1962 to 1969, and a Trustee of the Sloan Foundation from 1975 to 1980. This grant will contribute toward the establishment of the George P. Shultz Professorship in the Graduate School of Business. (Project director: John P. Gould, Dean of the Graduate School of Business; Grant period: January 1987-December 1989.)

Massachusetts Institute of Technology **$165,000**
Cambridge, Massachusetts 02139

Council on Foreign Relations, Inc. **$55,000**
58 East 68th Street
New York, New York 10021

These two grants support a coordinated effort aimed at expanding knowledge and understanding of the increasingly important role played by scientific and technological change in international affairs. At MIT, Professor Eugene Skolnikoff, the former director of the Institute's Center for International Affairs, is undertaking an ambitious effort to examine the implications of scientific and technological forces for the nature of statehood, the meaning of security, and the development of foreign and domestic policies affecting international trade. Such matters as economic competition, technology transfers, international scientific cooperation, resource needs and North/South relations are to be included. In concert with this research, the Council on Foreign Relations has initiated a two-

phase series of high-level meetings of leading domestic and international experts on technology and foreign policy issues. The first set of meetings will focus upon improving U.S. understanding of foreign perspectives and is designed to feed directly into Professor Skolnikoff's research activities. In the second phase, another group of experts will come together to discuss and criticize draft chapters of the book emerging from this research. (Project directors: Eugene B. Skolnikoff, Professor of Political Science, MIT, and Paul H. Kreisberg, Director of Studies, Council on Foreign Relations; Grant period: October 1986-September 1988.)

Officer Grants for Miscellaneous Purposes

Council on Foundations, Inc. **$23,200**
1828 L Street, NW
Washington, D.C. 20036

A membership contribution of the Sloan Foundation for 1986. (Project director: James A. Joseph, President.)

Independent Sector **$6,900**
1828 L Street, NW
Washington, D.C. 20036

A membership contribution of the Sloan Foundation for 1986. (Project director: Martin A. Paley, Treasurer.)

Institute of International Education **$20,000**
809 United Nations Plaza
New York, New York 10017

For a study of "Study Abroad" programs sponsored by American universities and colleges. (Project director: Elinor G. Barber, Director of Research; Grant period: April 1986-March 1987.)

New York Regional Association of Grantmakers **$6,700**
505 Eighth Avenue
New York, New York 10018

A membership contribution of the Sloan Foundation for 1986. (Project director: Barbara Bryan, Executive Director.)

Nonprofit Coordinating Committee of New York **$475**
419 Park Avenue South
New York, New York 10016

For membership dues of the Sloan Foundation for 1986. (Project director: Lisa Semple, Executive Director.)

Princeton University **$25,000**
Princeton, New Jersey 08544

Toward a scholarship fund established in memory of Frank A. Petito. (Project director: William G. Bowen, President.)

Research Foundation of the City University of New York **$6,900**
1515 Broadway
New York, New York 10036

For partial support of the editing of the diary and correspondence of Robert Morris. (Project director: Elizabeth M. Nuxoll, Coeditor, The Papers of Robert Morris, Queens College of the City University of New York; Grant period: January 1986-January 1987.)

United Way of Tri-State **$3,500**
99 Park Avenue
New York, New York 10016

A civic grant made as a contribution to United Way's annual fund-raising drive. (Project director: Calvin Green, President.)

We Care About New York, Inc. **$10,000**
One Madison Avenue
New York, New York 10010

A civic grant for general support. (Project director: Donald C. Platten, Co-Chairperson; Grant period: September 1986-September 1987.)

Financial Review

Financial Review

The financial statements and schedules of the Foundation, which have been audited by Ernst & Whinney, independent auditors, appear on pages 72 to 88. They include balance sheets, statements of income, expenses and changes in fund balance and changes in financial position, and schedules of management and investment expenses, investments, and grants and appropriations.

Investment and other income for 1986 was $27,611,432, a decrease of $2,191,725 from $29,803,157 in 1985. After the deduction of investment expenses and provision for Federal excise tax from investment and other income, net investment income was $24,713,090 in 1986 as compared with $27,732,864 for the prior year. Investment expenses during 1986 totaled $1,228,342 of which $818,322 represented investment counsel fees. Provision for Federal excise tax amounted to $1,670,000. The total of these deductions from income in 1986 was $2,898,342 versus $2,070,293 in 1985.

The total of grants and appropriations authorized, net of grant refunds, and management expenses during 1986 was $22,879,845. This sum was $1,833,245 under 1986 net investment income. Of this total, grants and appropriations authorized amounted to $20,911,998 while management expenses were $2,076,158. Since the Foundation's inception in 1934, the cumulative excess of grants and expenses over the Foundation's income has amounted to $35,538,687.

Grant and appropriation payments in 1986 were $18,721,037 compared with $19,234,455 the prior year. Together with management expenses, investment expenses, Federal excise taxes paid and other charges, the total of cash expenditures net of grant refunds in 1986 was $22,952,625, while in 1985 the amount was $23,050,740.

The market value of the Foundation's total assets was $482,691,644 at December 31, 1986, including investments valued at $482,495,299, as compared with total assets of $434,510,048 at December 31, 1985. A summary of the Foundation's investments at cost and market value at December 31, 1986 appears on page 77.

A listing of grants made during 1986, including grants and appropriations authorized and payments during the year, will be found on pages 84 to 88.

Report of Ernst & Whinney Independent Auditors

Board of Trustees
Alfred P. Sloan Foundation
New York, New York

We have examined the balance sheets of the Alfred P. Sloan Foundation as of December 31, 1986 and 1985 and the related statements of income, expenses and changes in fund balance and changes in financial position for the years then ended and the supplementary schedules of investments at December 31, 1986, grants and appropriations for the year then ended and management and investment expenses for the years ended December 31, 1986 and 1985. 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, the financial statements referred to above present fairly the financial position of the Alfred P. Sloan Foundation at December 31, 1986 and 1985, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis. Also, in our opinion, the supplementary schedules referred to above are fairly stated in all material respects in relation to the financial statements taken as a whole.

Ernst & Whinney

New York, New York
January 30, 1987

Balance Sheets

December 31, 1986 and 1985

	1986	1985
Assets		
Investments:		
Fixed income:		
Government and U.S. agency	$ 50,086,435	$ 74,975,163
Corporate and other	110,217,207	83,325,769
	160,303,642	158,300,932
Equity:		
General Motors Corporation	38,759,483	40,158,894
Other	201,506,305	138,163,861
	240,265,788	178,322,755
Total investments (market value: $482,495,299 in 1986 and $434,481,960 in 1985)	400,569,430	336,623,687
Interest purchased	295,199	201,953
Cash	(98,854)	28,088
Total	$400,765,775	$336,853,728
Liabilities and Fund Balance		
Grants and appropriations unpaid	$ 22,122,803	$ 19,931,842
Federal excise tax and other liabilities	1,766,850	1,035,621
Fund balance	376,876,122	315,886,265
Total	$400,765,775	$336,853,728

See accompanying notes to financial statements.

Statements of Income, Expenses and Changes In Fund Balance

For the years ended December 31, 1986 and 1985

	1986	1985
Investment Income:		
Dividends	$ 12,650,219	$ 12,311,914
Interest	14,953,211	17,469,180
Other	8,002	22,063
	27,611,432	29,803,157
Less:		
Investment expenses	1,228,342	1,041,293
Provision for Federal excise tax	1,670,000	1,029,000
	2,898,342	2,070,293
	24,713,090	27,732,864
Grants and management expenses:		
Grants and appropriations authorized (net of grant refunds of $108,311 in 1986 and $75,613 in 1985)	20,803,687	22,287,595
Management expenses	2,076,158	1,944,671
Total	22,879,845	24,232,266
Grants and expenses less than income for the year	1,833,245	3,500,598
Net gain on disposals of securities	59,156,612	24,971,139
NET CHANGE IN FUND BALANCE FOR YEAR	60,989,857	28,471,737
Fund balance January 1	315,886,265	287,414,528
FUND BALANCE AT END OF YEAR	$376,876,122	$315,886,265

See accompanying notes to financial statements.

Statements of Changes in Financial Position

For the years ended December 31, 1986 and 1985

	1986	1985
SOURCE OF FUNDS:		
Investment income	$27,611,432	$29,803,157
Net gain on disposals of securities	59,156,612	24,971,139
Other	96,628	
	86,864,672	54,774,296
APPLICATION OF FUNDS:		
Grant and appropriation payments (net of grant refunds of $108,311 in 1986 and $75,613 in 1985)	18,612,726	19,158,842
Management expenses	2,076,158	1,944,671
Investment expenses	1,228,342	1,041,293
Federal excise taxes paid	1,035,399	759,862
Other		146,072
	22,952,625	23,050,740
INCREASE (DECREASE) IN FUNDS CONSISTING OF:		
Cost of investments	63,945,743	32,708,882
Amount due for securities sold, not delivered		(650,513)
Interest purchased	93,246	(223,465)
Cash balances	(126,942)	(111,348)
NET INCREASE	$63,912,047	$31,723,556

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 management expenses are recorded on the cash basis, the effect of which on the accompanying financial statements is not materially different from the accrual basis.

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

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 $158,464 and $145,761 for 1986 and 1985, respectively.

3. LEASE

The Foundation's lease for its office space expires April 30, 1993. The lease contains an escalation clause which provides for rental increases resulting from increases in real estate taxes and certain other operating expenses. Under the lease, rent was $525,369 in 1986 and $532,426 before sublease income in 1985.

4. FUND BALANCE

Fund balance, at year end, is comprised of the following:

	1986	1985
Principal	$412,414,809	$353,258,198
Income — cumulative excess of grants and expenses over income from inception of the Foundation	(35,538,687)	(37,371,933)
Fund balance	$376,876,122	$315,886,265

Schedules of Management and Investment Expenses

For the years ended December 31, 1986 and 1985

	1986	1985
MANAGEMENT EXPENSES		
Salaries and employee benefits:		
Salaries	$1,026,144	$1,015,637
Employees' retirement plan and other benefits	344,070	315,118
Total	1,370,214	1,330,755
Rent (Net of sublease rental of approximately $16,000 for 1985)	525,369	511,391
Program expenses	279,566	251,969
Office expenses and services	237,598	138,805
Reports and publications	26,545	25,273
Professional fees	46,886	50,389
Total management expenses	2,486,178	2,308,582
Less management expenses applicable to investments	410,020	363,911
Management expenses applicable to grant making	$2,076,158	$1,944,671
INVESTMENT EXPENSES		
Investment counsel fees	$ 818,322	$ 677,382
Management expenses applicable to investments	410,020	363,911
Total investment expenses	$1,228,342	$1,041,293

Schedule of Investments

December 31, 1986

SUMMARY	Cost	Market Amount	Market Percent of Total Investment
Fixed income:			
Government and U.S. agency	$ 50,086,435	$ 52,298,294	10.8%
Corporate and others	110,217,207	113,884,966	23.6
Total fixed income	160,303,642	166,183,260	34.4
Equity:			
General Motors Corporation	38,759,483	62,231,563	12.9
Other	201,506,305	254,080,476	52.7
Total equity	240,265,788	316,312,039	65.6
Total investments	$400,569,430	$482,495,299	100.0%

FIXED INCOME		Principal	Cost	Market
Government and U.S. Agency obligations:				
U.S. Treasury:				
11¼% Notes 5/15/95		$10,650,000	$11,499,833	$13,245,938
7⅛% Notes 5/15/96		3,000,000	3,021,563	3,016,860
9⅛% Bonds 11/15/2015		4,800,000	6,028,500	5,904,000
7¼% Bonds 5/15/2016		7,500,000	7,211,250	7,162,500
Federal Housing Administration 7.43% Pools 9/1/2022		19,777,258	17,734,523	18,138,027
Total United States			45,495,669	47,467,325
United Kingdom:				
10% Bonds 7/12/91	(Sterling)	1,800,000	2,501,051	2,639,903
10½% Bonds 5/19/99	(Sterling)	700,000	984,546	1,036,688
10% Conversion Stock 4/11/2022	(Sterling)	800,000	1,105,169	1,154,378
Total United Kingdom			4,590,766	4,830,969
Total government and U.S. Agency obligations			50,086,435	52,298,294
Corporate and other:				
Short term:				
Interest bearing demand notes		1,267,000	1,267,000	1,267,000
Commercial paper:				
Chevron Oil Financial Corp. 6.94% 1/21/87		3,000,000	3,000,000	3,000,000
Citicorp 13.02% 1/5/87		6,048,000	6,048,000	6,048,000
Ford Motor Credit Co. 17.27% 1/2/87		15,110,000	15,110,000	15,110,000

Schedule of Investments

December 31, 1986

(continued)

FIXED INCOME		Principal	Cost	Market
Corporate and other (continued):				
Short term (continued):				
General Electric Credit Corp.				
11.28% 1/6/87		$ 3,000,000	$ 3,000,000	$ 3,000,000
Prudential Funding Corp.				
5.98% 1/5/87		3,000,000	3,000,000	3,000,000
Time deposits:				
Barclays Bank, PLC				
6.69% 1/5/87	(Deutsche Marks)	3,536,311	1,806,775	1,839,912
7.31% 1/5/87	(Francs)	2,580,335	398,908	404,917
11.81% 1/5/87		585,565	585,565	585,565
Total short term			34,216,248	34,255,394
Long term:				
Air Products and Chemicals, Inc.				
14⅜% Notes 8/1/87		1,000,000	995,000	1,042,580
Ameritrust Corp.				
7¼% Notes 12/15/93		5,200,000	5,181,800	5,186,220
Atlantic Richfield Co.				
9⅛% Debentures 3/1/2016		5,000,000	4,993,750	5,575,900
Chesapeake & Ohio Railway Co.				
8½% Conditional Sale Agreement 1/1/89		287,519	231,748	291,831
Citicorp				
10¾% Notes 6/15/2010		3,800,000	4,186,726	4,251,060
Citicorp Person to Person, Inc.				
12½% Subordinated Capital Notes 1/15/96		3,000,000	3,322,500	3,401,790
Connecticut General Life Insurance Co.				
10¼% Funding Agreement 11/12/88		7,000,000	7,000,000	7,385,000
Cooper Industries, Inc.				
7⅞% Notes 12/23/93		5,000,000	5,000,000	4,950,000
Dresdner Bank, AG				
6½% Bonds 3/18/96	(Deutsche Marks)	51,000	31,821	42,588
E.I. duPont de Nemours and Co.				
14% Notes 12/1/91		3,000,000	2,915,000	3,393,660
Ford Motor Credit Co.				
12.20% Notes 3/28/90		3,000,000	3,000,000	3,324,960
8¾% Notes 3/1/96		9,000,000	9,101,250	9,358,740
General Motors Acceptance Corp.				
12¼% Notes 10/1/87		2,000,000	2,043,040	2,070,020
14⅛% Notes 6/15/89		2,000,000	1,956,180	2,078,860
Household Finance Corp.				
10¼% Notes 12/1/87		3,500,000	3,491,250	3,611,230

Schedule of Investments

December 31, 1986

(continued)

FIXED INCOME		Principal	Cost	Market
Corporate and other (continued):				
Long term (continued):				
International Bank for Reconstruction and Development				
14⅜% Notes 8/1/87		$ 3,000,000	$ 3,321,570	$ 3,139,800
Mellon Bank, N.A.				
11.60% Certificate of Deposit 1/13/89		1,600,000	1,592,000	1,742,848
NCNB Corp.				
14½% Notes 9/1/92		3,000,000	3,007,500	3,452,280
Puget Sound Power & Light Co.				
8¼% First Mortgage Bonds 4/1/96		3,000,000	2,981,250	2,998,680
Southern Bell Telephone and Telegraph Co.				
8⅛% Debentures 9/1/2026		5,500,000	5,403,200	5,433,615
Standard Oil Co. (Ohio)				
13⅛% Notes 9/15/92		3,000,000	2,981,250	3,409,200
Thomson, CSF				
9.20% Bonds 1/1/94	(Francs)	440,000	60,648	102,880
Thomson Brandt International Finance, CSF				
8% Convertible Bonds 1/2/96		170,000	176,650	237,575
Woolworth Holding, PLC				
8½% Cumulative Unsecured Loan 10/31/2000	(Sterling)	20,400	26,826	48,415
Xerox Corp.				
10½% Notes 3/1/88		3,000,000	3,000,000	3,099,840
Total long term			76,000,959	79,629,572
Total corporate and other			110,217,207	113,884,966
Total fixed income securities			$160,303,642	$166,183,260

Schedule of Investments

December 31, 1986

(continued)

EQUITY	Number of Shares	Cost	Market
United States:			
American Standard, Inc.	88,200	$ 3,979,547	$ 3,781,575
Atlantic Richfield Co.	29,400	1,730,857	1,764,000
Avantek, Inc.	58,800	1,070,150	896,700
Avnet, Inc.	88,200	2,869,256	2,271,150
Bankers Trust New York Corp.	29,400	1,237,152	1,330,350
Beverly Enterprises	205,800	3,808,332	3,369,975
Black & Decker Corp.	29,400	469,456	477,750
Borden, Inc.	58,800	2,342,317	2,756,250
Burlington Industries, Inc.	53,800	1,435,238	2,232,700
CNA Financial Corp.	29,400	1,469,516	1,580,250
CSX Corp.	93,200	2,664,145	2,714,450
Capital Cities/ABC, Inc.	25,405	6,038,845	6,811,716
Caterpillar, Inc.	29,400	1,597,367	1,179,675
Champion International Corp.	147,000	3,922,079	4,520,250
Charming Shoppes, Inc.	44,100	837,075	876,488
Chase Manhattan Corp.	114,600	2,502,369	4,082,625
Chemical New York Corp.	66,600	1,884,134	2,813,850
CIGNA Corp.	60,800	4,018,713	3,344,000
Citicorp	114,500	4,701,277	6,068,500
Clorox Co.	58,800	3,174,364	2,976,750
Commonwealth Edison Co.	72,900	2,282,133	2,469,488
Community Psychiatric Centers	64,000	1,643,622	1,936,000
Consumers Power Co.	117,600	1,299,391	1,837,500
Deere & Co.	87,600	2,644,449	2,003,850
Delta Airlines, Inc.	29,400	1,439,277	1,414,875
Endowment & Foundation Realty, Ltd. — JMB III	2,500	2,500,000	2,522,855
Federated Department Stores, Inc.	14,700	1,105,281	1,223,775
Figgie International, Inc.	58,900	2,817,450	3,180,600
Fleetwood Enterprises, Inc.	58,800	1,402,736	1,492,050
Fremont General Corp.	64,000	1,554,125	1,032,000
General Cinema Corp.	19,100	850,635	845,175
General Electric Co.	69,900	2,627,093	6,011,400
General Motors Corp.	925,000	38,084,538	61,050,000
General Motors Corp., Class E	47,500	674,945	1,181,563
Gulf & Western, Inc.	58,800	3,463,858	3,726,450
Gulf States Utilities Co.	294,000	2,460,340	2,168,250
Henley Group, Inc.	24,075	505,575	544,697
Hershey Foods Corp.	29,400	688,533	723,975
Home Federal Savings & Loan Association	29,400	788,802	775,425
IMS International, Inc.	29,400	679,875	705,600
Imperial Chemical Industries, PLC	44,600	1,753,052	2,809,800
Inco, Ltd.	58,800	819,084	690,900
Intel Corp.	29,400	664,294	617,400
International Business Machines Corp.	191,050	10,383,311	22,926,000

Schedule of Investments

December 31, 1986

(continued)

EQUITY	Number of Shares	Cost	Market
United States (continued):			
International Paper Co.	57,600	$ 3,308,656	$ 4,327,200
Johnson Controls, Inc.	29,400	1,623,007	1,683,150
Kansas Gas & Electric Co.	138,400	1,674,497	3,165,900
Long Island Lighting Co.	147,000	1,716,225	1,488,375
MCI Communications Corp.	176,400	1,379,980	1,102,500
Manufacturers Hanover Corp.	65,200	2,334,569	2,942,150
MAPCO, Inc.	93,500	3,416,545	5,539,875
Marion Laboratories, Inc.	94,000	2,139,131	3,548,500
Maxicare Health Plans, Inc.	227,400	4,447,359	3,553,125
Middle South Utilities, Inc.	643,900	8,270,521	8,451,188
Monolithic Memories, Inc.	86,400	1,488,130	1,058,400
Morgan (J.P.) & Company, Inc.	137,500	1,294,428	11,343,750
Northern Indiana Public Service Co.	261,000	3,077,431	3,066,750
Penney (J.C.) Co.	21,000	1,081,017	1,517,250
Philip Morris Companies, Inc.	93,800	4,610,075	6,741,875
Price Co.	117,600	4,684,423	3,851,400
Punta Gorda Isles, Inc.	30,000	403,755	60,000
Quaker Oats Co.	29,400	1,014,712	1,176,000
Ralston Purina Co.	58,100	3,014,017	4,110,575
Ryans Family Steak Houses, Inc.	164,700	1,210,075	3,520,463
Schlumberger, Ltd.	55,675	743,457	1,767,681
Shell Transport & Trading Company, PLC (NY shares)	128,600	4,813,291	7,523,100
Squibb Corp.	9,975	932,031	1,137,150
Tenneco, Inc.	74,200	2,994,437	2,838,150
Texaco, Inc.	146,700	4,407,333	5,262,863
Textron, Inc.	29,400	1,886,135	1,852,200
Times Mirror Co.	29,400	1,704,081	1,866,900
Toys "R" Us, Inc.	163,200	4,127,297	4,692,000
UAL, Inc.	29,400	1,531,881	1,536,150
U.S. HealthCare, Inc.	148,000	2,491,832	1,720,500
US West, Inc.	44,400	1,215,935	2,397,600
Union Carbide Corp.	117,600	2,630,014	2,646,000
Zayre Corp.	88,200	2,488,731	2,116,800
Australia, Hong Kong and Singapore:			
Broken Hill Proprietary Company, Ltd.	60,000	351,029	352,050
City Developments, Ltd.	500,000	528,650	506,912
Dairy Farm International Holdings, Ltd.	480,000	188,575	302,022
Development Bank of Singapore	150,000	655,181	625,576
HK-TVB, Ltd.	300,000	278,904	400,642
Hang Seng Bank	70,000	304,348	373,034
Hong Kong and Shanghai Banking Corp.	1,000,000	924,922	1,187,801

Schedule of Investments

December 31, 1986

(continued)

EQUITY	Number of Shares	Cost	Market
Australia (continued):			
Hong Kong Land Co.	960,000	$ 825,450	$ 832,103
Hutchison Whampoa, Ltd.	60,000	326,539	356,340
I.C.I. Australia, Ltd.	65,000	136,380	139,669
Inchcape Berhad	600,000	810,333	768,664
Jardine Matheson and Co.	200,912	346,378	580,484
Pacific Dunlop, Ltd.	6,583	4,061	17,517
Pioneer Concrete Services, Ltd.	150,000	301,762	301,358
Singapore Airlines, Ltd.	80,000	217,393	339,172
Singapore Press Holdings, Ltd.	120,000	351,213	431,336
Swaire Pacific, Ltd.	246,471	294,392	639,322
Canada, Netherlands and Sweden:			
Buehrmann-Tetterode, NV	20,000	431,571	527,018
CDC Life Sciences, Inc.	30,000	389,100	389,700
Electrolux, AB	11,000	510,513	506,440
Lonvest Corp. (warrants)	4,000	8,970	13,319
Pharmacia, AB (ADR)	12,000	212,400	265,500
Saab-Scandia, AB	3,000	182,171	315,322
Toronto Dominion Bank	15,000	246,753	257,872
Unilever, NV	1,500	215,848	358,013
Federal Republic of Germany:			
BASF, AG	128	9,080	18,314
Bayer, AG	4,714	671,058	778,717
Continental Gummi-Werke, AG	1,000	125,836	179,240
Deutsche Bank, AG	700	95,105	299,012
Nixdorf Computer, AG, Preferred	1,400	431,888	546,306
Siemens Western Finance, NV (warrants)	2,600	607,392	660,146
France and Switzerland:			
Immeubles de la Plaine Monceau	28	1,845	4,389
Matra, SA	900	237,521	333,025
Michelin (warrants)	1,000	100,003	236,956
Midi (Cie du)	1,500	181,387	386,740
Navigation Mixte (Cie de)	2,000	164,127	326,402
Peugeot, SA (warrants)	5,000	214,625	729,698
Schweiz-Ruckversicherungs (part. ctf.)	186	117,718	395,228
Thomson, CSF	1,500	133,428	368,380
Japan:			
Advantest	9,000	305,776	256,167
Canon, Inc.	100,000	665,146	638,836
Daiwa House Industry Company, Ltd.	31,000	123,235	352,941
Daiwa Securities Company, Ltd.	10,600	41,560	115,319
Fuji Machine Manufacturing, Ltd.	30,000	124,634	107,210
Hitachi, Ltd.	40,000	264,815	280,835

Schedule of Investments

December 31, 1986

(continued)

EQUITY	Number of Shares	Cost	Market
Japan (continued):			
Honda Motor Company, Ltd.	35,000	$ 285,069	$ 305,503
Hoya Corp.	22,000	302,977	328,400
Jusco Company, Ltd.	15,000	49,690	132,827
Kyocera Corp.	12,000	300,629	303,605
Makita Electric Works, Ltd.	20,000	141,028	179,633
Marudai Food Company, Ltd.	16,000	84,798	92,094
Marui Company, Ltd.	7,000	71,802	126,186
Murata Manufacturing, Ltd.	20,000	285,768	333,966
NEC Corp.	17,000	164,333	221,505
Nippon Express Company, Ltd.	20,000	77,586	158,128
Orient Finance Company, Ltd.	5,000	20,369	38,583
Orient Leasing Ltd.	5,000	53,741	123,340
Ryosan Corp.	10,000	146,433	145,478
Shionogi, Ltd.	20,000	124,147	218,849
Sony Corp.	14,000	298,310	305,503
Sumitomo Corp.	5,000	13,522	30,835
Sumitomo Marine and Fire Insurance Company, Ltd.	15,000	62,088	94,877
TDK Corp.	14,000	307,286	341,809
Takeda Chemical Industries, Ltd.	10,000	90,491	166,983
Tanabe Seiyaku Company, Ltd.	15,000	102,975	173,624
Tokyu Corp.	30,000	121,016	237,192
Uni-Charm Corp.	500	7,903	11,796
United Kingdom:			
BOC Group, PLC	156,056	782,560	861,098
BTR, PLC	60,000	225,854	241,185
Cable and Wireless, PLC	72,000	316,114	351,364
Coats Viyella, PLC	64,706	417,805	444,380
Exco International, PLC	110,000	377,570	438,908
Guardian Royal Exchange, PLC	25,000	293,437	287,389
Hanson Trust, PLC	120,000	308,596	336,412
Hanson Trust, PLC 5¼% Convertible Cumulative Redeemable Preferred	10,000	13,514	16,835
Lloyds Bank, PLC	60,000	321,681	396,041
Logica, PLC	75,000	192,375	238,070
Mercantile House Holding, PLC	75,000	357,202	332,630
National Westminster Bank, PLC	61,500	397,706	499,902
Pilkington Brothers, PLC	40,000	287,408	391,591
U.E.I., PLC	50,000	163,394	260,319
Total equity		240,265,788	316,312,039
Total fixed income		160,303,642	166,183,260
Total investments		$400,569,430	$482,495,299

1986
Schedule of Grants and Appropriations

	Unpaid Dec. 31, 1985	1986 Authorized	1986 Payments	Unpaid Dec. 31, 1986
Alabama, University of	—	$ 300,000	—	$ 300,000
American Academy of Arts and Sciences	$ 150,000	20,000	$ 170,000	—
American Arbitration Association	85,000	—	85,000	—
American Association for the Advancement of Science	—	25,000	25,000	—
American Committee on East-West Accord	50,000	—	50,000	—
American Council of Learned Societies	—	100,000	40,000	60,000
American Economic Association	—	320,000	145,000	175,000
American Enterprise Institute for Public Policy Research	100,000	—	100,000	—
American Institute of Physics	—	30,000	30,000	—
American Productivity Management Association	—	20,000	20,000	—
American Psychological Association	—	50,000	—	50,000
American Statistical Association	—	20,000	20,000	—
Amherst College	100,000	—	50,000	50,000
Arizona, University of	—	120,665	95,665	25,000
Arms Control Association	—	20,000	20,000	—
Boston University	—	25,000	12,500	12,500
Bowdoin College	—	29,600	29,600	—
Brandeis University	162,500	—	112,500	50,000
Brookings Institution	150,000	400,000	265,000	285,000
Brooklyn Law School	—	79,500	79,500	—
Brown University	42,500	97,859	127,859	12,500
Bryn Mawr College	75,000	20,000	95,000	—
Bucknell University	70,000	—	35,000	35,000
Calgary, University of	—	25,000	12,500	12,500
California, University of	706,500	2,204,477	1,280,977	1,630,000
California Institute of Technology	123,000	147,880	177,380	93,500
Carleton College	250,000	—	75,000	175,000
Carnegie-Mellon University	540,000	153,980	403,980	290,000
Case Western Reserve University	—	25,000	12,500	12,500
Center for Advanced Study in the Behavioral Sciences	200,000	—	100,000	100,000
Center for Cultural and Technical Interchange Between East and West, Inc.	56,000	19,000	75,000	—
Chicago, University of	331,000	530,477	386,477	475,000
Claremont McKenna College	—	56,000	56,000	—
Claremont University Center	—	350,000	125,000	225,000
Cognitive Neuroscience Institute	125,000	—	—	125,000
Colby College	75,000	25,000	75,000	25,000
Cold Spring Harbor Laboratory	249,500	—	107,500	142,000
Colgate University	100,000	—	50,000	50,000

1986
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1985	1986 Authorized	1986 Payments	Unpaid Dec. 31, 1986
Colorado, University of	—	$ 25,000	$ 12,500	$ 12,500
Colorado State University	$ 12,500	25,000	25,000	12,500
Columbia University	195,000	278,530	288,530	185,000
Committee for National Security	—	25,000	25,000	—
Cornell University	12,500	115,000	90,000	37,500
Council on Foreign Relations	—	80,000	50,000	30,000
Council on Foundations, Inc.	—	23,200	23,200	—
Council on Library Research	80,000	—	80,000	—
Dana-Farber Cancer Institute	—	20,000	20,000	—
Dartmouth College	—	70,000	70,000	—
Davidson College	200,000	—	75,000	125,000
Denison University	—	25,000	—	25,000
Duke University	740,500	1,643,054	1,428,054	955,500
Exploratorium	—	200,000	—	200,000
Franklin and Marshall College	100,000	—	50,000	50,000
Fund for the City of New York	120,000	15,000	45,000	90,000
GMI Engineering and Management Institute	187,500	—	125,000	62,500
Georgetown University	—	68,650	68,650	—
Georgia, University of	—	25,000	12,500	12,500
Georgia Tech Research Institute	12,500	—	12,500	—
Gordon Research Conferences	—	17,000	17,000	—
Grinnell College	—	270,000	95,000	175,000
Hampshire College	—	34,000	34,000	—
Harvard University	473,500	1,018,050	1,128,550	363,000
Harvey Mudd College	—	25,000	—	25,000
Hawaii, University of	—	40,000	—	40,000
Houston, University of	—	30,000	30,000	—
Illinois, University of	50,000	100,000	100,000	50,000
Independent Sector	—	6,900	6,900	—
Indiana University Foundation	12,500	25,000	25,000	12,500
Institute for Advanced Study	12,500	25,000	25,000	12,500
Institute for International Economics	300,000	—	100,000	200,000
Institute of International Education	—	20,000	20,000	—
Iowa, University of	25,000	—	25,000	—
Johns Hopkins University	60,000	244,625	94,125	210,500
Joint Council on Economic Education	—	86,000	86,000	—
Lafayette College	—	250,000	50,000	200,000
Linguistic Society of America	50,000	—	50,000	—
Louisiana State University	—	12,500	12,500	—
Manpower Demonstration Research Corp.	—	25,000	25,000	—
Marine Biological Laboratory	—	62,400	22,400	40,000
Maryland Foundation, Inc., University of	37,500	134,777	112,777	59,500

1986
Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1985	1986 Authorized	1986 Payments	Unpaid Dec. 31, 1986
Massachusetts, University of	$ 12,500	$ 70,000	$ 57,500	$ 25,000
Massachusetts Institute of Technology	1,530,000	1,578,848	1,422,848	1,686,000
McGill University	25,000	—	25,000	—
Medical and Health Research Association of New York City, Inc.	—	150,000	—	150,000
Memorial Sloan-Kettering Cancer Center	2,000,000	—	500,000	1,500,000
Miami, University of	—	103,000	103,000	—
Michigan, University of	145,500	216,670	324,670	37,500
Michigan State University	12,500	25,000	25,000	12,500
Middlebury College	134,000	—	70,000	64,000
Minnesota, University of	207,500	158,257	268,257	97,500
Missouri, University of	12,500	29,750	42,250	—
Mount Holyoke College	250,000	—	100,000	150,000
National Academy of Sciences	165,000	520,000	355,000	330,000
National Assembly of National Voluntary Health and Social Welfare Organizations, Inc.	—	60,000	60,000	—
National Bureau of Economic Research, Inc.	50,000	393,700	197,200	246,500
National Conference on Social Welfare	—	95,000	95,000	—
National Opinion Research Center	—	44,500	44,500	—
Nebraska, University of	12,500	—	12,500	—
Neuroscience Research Foundation	200,000	—	100,000	100,000
New Mexico, University of	12,500	—	12,500	—
New School for Social Research	—	44,900	44,900	—
New York City Partnership Foundation, Inc.	—	19,000	19,000	—
New York Hall of Science	—	100,000	100,000	—
New York Regional Association of Grantmakers	—	6,700	6,700	—
New York University	72,500	57,464	117,464	12,500
Nonprofit Coordinating Committee of New York, Inc.	—	475	475	—
North Carolina, University of	12,500	25,000	25,000	12,500
Northwestern University	12,500	37,200	37,200	12,500
Oberlin College	—	25,000	—	25,000
Ohio State University Research Foundation	25,000	—	25,000	—
Oklahoma State University	—	25,000	12,500	12,500
Oregon, University of	12,500	75,000	75,000	12,500
Pennsylvania, University of	287,500	66,550	241,550	112,500
Pittsburgh, University of	25,000	—	25,000	—
Population Reference Bureau	—	29,800	29,800	—
Princeton University	582,500	851,400	773,900	660,000

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Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1985	1986 Authorized	1986 Payments	Unpaid Dec. 31, 1986
Princeton University Press	$ 180,150	—	$ 60,000	$ 120,150
Purdue University	12,500	$ 25,000	25,000	12,500
Rand Corporation	—	530,000	205,000	325,000
Randolph, A. Philip, Educational Fund	—	10,500	10,500	—
Reed College	—	150,000	50,000	100,000
Research Foundation of State University of New York	1,150,000	379,500	781,000	748,500
Research Foundation of the City University of New York	62,500	100,900	130,900	32,500
Rice University	12,500	—	12,500	—
Rochester, University of	—	335,520	106,520	229,000
Rochester Institute of Technology	—	26,000	26,000	—
Rockefeller University	—	197,000	—	197,000
Rollins College	—	20,000	—	20,000
Rutgers University Foundation	12,500	19,779	32,279	—
San Francisco, University of	—	30,000	30,000	—
Sante Fe Institute	—	30,000	30,000	—
Saskatchewan, University of	—	25,000	—	25,000
Smith College	53,000	—	53,000	—
Smithsonian Institution	—	231,000	131,000	100,000
Society for Neuroscience	—	8,000	8,000	—
Southern California, University of	—	23,000	23,000	—
Stanford University	760,000	826,624	479,124	1,107,500
Statue of Liberty-Ellis Island Foundation, Inc.	—	30,000	30,000	—
Stevens Institute of Technology	—	30,000	30,000	—
Swarthmore College	100,000	—	50,000	50,000
Syracuse University	112,500	25,000	75,000	62,500
Texas, University of	37,500	133,500	158,500	12,500
Toronto, University of	—	23,483	23,483	—
Trinity College	100,000	—	50,000	50,000
Tufts University	100,000	5,000	55,000	50,000
Union College	—	270,000	95,000	175,000
United Way of Tri-State	—	3,500	3,500	—
Urban Institute	120,000	—	60,000	60,000
Utah, University of	25,000	146,500	101,500	70,000
Vanderbilt University	—	38,000	38,000	—
Vassar College	175,000	20,000	95,000	100,000
Virginia, University of	12,500	14,955	27,455	—
Virginia Commonwealth University	12,500	—	12,500	—
WGBH Educational Foundation	250,000	—	125,000	125,000
Washington, University of	25,000	125,260	150,260	—
Washington University	12,500	—	12,500	—
Waterloo, University of	—	75,000	—	75,000
Wayne State University	—	25,000	12,500	12,500
We Care About New York, Inc.	—	10,000	10,000	—

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Schedule of Grants and Appropriations
(continued)

	Unpaid Dec. 31, 1985	1986 Authorized	1986 Payments	Unpaid Dec. 31, 1986
Wellesley College	$ 60,000	$ 270,000	$ 180,000	$ 150,000
Western Ontario, University of	—	255,000	85,000	170,000
Wisconsin, University of	170,000	79,565	127,065	122,500
Yale University	325,500	190,620	353,620	162,500
Sloan Research Fellowships to be granted in ensuing year	2,250,000	—	—	2,250,000
Sloan Doctoral Dissertation Fellowships to be granted in ensuing year	—	950,000	—	950,000
Officer grant appropriation for grants in ensuing year	1,200,000	300,000	—	1,500,000
Book program	288,326	—	215,673	72,653
Other appropriations for grants and related expenses	90,366	(14,700)	45,666	30,000
	19,931,842	21,060,844	18,869,883	22,122,803
Reduction for grant transfers		148,846	148,846	
	$19,931,842	$20,911,998	$18,721,037	$22,122,803

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