

Director's Statement

First Step in a Decade of Change

In the last Annual Report, I referred to the 1970's as a transitional decade. Now the opening year of the decade has passed. What is new? What do the changes mean? Are we moving in the right direction—even though our final destination isn't in sight?

In science, which is so critical to the survival of our society, some of the answers to these questions are to be found in the activities of the National Science Foundation during fiscal year 1971.

Most things, as a matter of fact, are still the same. The Foundation's central commitment to progress in fundamental research remains unchanged. We maintain a continuing concern for education in science and those institutions involved in science education. As in the past, the Foundation must continue its leadership role in the Federal support of science.

While holding fast to these well-established themes, changing times and needs require that such themes be carried out differently and with different emphases. This may mean fiscal reductions in some areas, increases in others. At the same time, new initiatives and policies must also be instituted. Both the adaptation of traditional NSF policies and the creation of new policies have indeed changed the status quo.

In our core program of research support (the familiar disciplinary project grant), every discipline has received additional funding in fiscal year 1971—though some of this increase merely compensated for research support other agencies were forced to drop. The social sciences, engineering, biological

sciences, and oceanography received special emphasis in fiscal year 1971. These areas were selected for emphasis, in large part, because anticipated research results are believed likely to provide options for helping solve some of our urgent problems.

In selecting disciplines for special attention, we are, in effect, engaging only in fine tuning. Fundamental science flourishes best, it seems to me, when scientific inquiry is guided primarily by scientific interest and opportunity. By adhering to this principle, NSF's support of superior research will help maintain the nation's position of scientific leadership.

The most important NSF development in 1971, continuing an effort started last year, was the establishment of a new Research Applications Directorate to provide a single management focus to problem-oriented research. Although problem-oriented research has been supported by the Foundation for more than a decade, the new directorate will concentrate additional resources upon specific problems of national concern. Major programs of the Research Applications Directorate are designed to help scientists increase societal benefits from research, exploit promising scientific and technological opportunities, and provide a base to advance national economic growth and productivity. This new directorate—which comprises about 10 percent of the fiscal year 1972 NSF budget—will support work in four broad areas: environmental systems and resources, social systems and human resources, advanced technology applications, and exploratory research and problem assessment. In addition, the Research Applications Directorate is charged with the strengthening of science resources available to State and local governments, and with encouraging State and local officials to exploit the potential for applying science and technology.

I am keenly aware of the strong interactions between the programs of the Research Applications Directorate and the interests and responsibilities of other Federal agencies, as well as State governments and private industry. Therefore, NSF efforts will be

carefully coordinated with these other parties, and it is intended to complement and underpin the existing capabilities of others through cooperative effort.

While NSF efforts are directed both toward the traditional forms of support for fundamental research and in the direction of research applied to national needs, certain problems are—and I suppose always will be—the same. The increasing complexity of scientific investigation, ever more sophisticated equipment, and the growing community of researchers all place heavier fiscal pressures on the Foundation and force greater selectivity on our part. I believe the programs undertaken with the resources available represent a balanced and reasonably comprehensive support of both fundamental research and problem-focused research.

We support efforts at NSF which, in addition to being fundamental or problem-oriented in character, are designated as National and Special Research Programs for purposes of management. These are major undertakings which relate to specific geographic areas or are of such broad scope or magnitude that special efforts in planning, management, funding, and logistic support are essential. Some of these programs have been under way for many years—the U.S. Antarctic Research Program and, more recently, the International Biological Program. Fiscal year 1971 marked the beginning of scientific activities for the International Decade of Ocean Exploration (IDOE), for which NSF has been designated lead agency for the United States. The IDOE will apply the combined resources of many nations to expand our knowledge of the earth's marine environment for mutual benefit.

During fiscal year 1971, plans for the University National Oceanographic Laboratory System (UNOLS) were developed for improved management of ship operations and oceanographic facilities at academic institutions. The objective of UNOLS is to use a systems approach to the sharing of large oceanographic facilities by the academic community.

Changes in the status quo are evidenced in more than just new activities or increased support for existing programs. As needs change, as worthy programs approach the practical fulfillment of their original objectives, priority shifts are forced by limited resources. For this reason, while most NSF programs received increased funding in 1971, several were redirected or phased out. Fiscal reductions have been most pronounced in NSF's institutional and educational support sectors. During fiscal year 1971, a decision was made to assign a higher priority to research support and, as a consequence, the Science Development Program was suspended. The Graduate Science Facilities Program ended the previous year.

Important changes in program emphasis are under way in NSF's science education programs. As in the case of institutional development, certain long-term objectives have been largely achieved or their priorities necessarily reduced. I would stress that the changes, intended to make more efficient use of our resources, were undertaken only after our most intensive consideration. After taking into account such factors as societal needs, program effectiveness, expected program duration, and the minimum levels of support required to keep satisfactory programs operating, we concluded that the new order of emphasis should be curriculum development, teacher improvement, and student support. In practice, this means:

- Curriculum development focused more directly on social and environmental problems, particularly those of a multidisciplinary nature;
- Local school systems helped to augment their own capabilities for science education programs by training science educators as specialists within their own institutions;
- Broadened career alternatives made available in science and engineering at both the graduate and technologist levels. At the technologist level, we are seeking to help fulfill the need for technologists who have received substantial college-

level training in specific fields so they can aid senior research and development personnel.

By concentrating more of our resources for science education on these types of activities, we expect to sustain a high-quality science education program which will affect a wide range of students and teachers. To accomplish this goal, however, it was necessary for us to make a significant reorientation in the Foundation's direct support for graduate education. In fiscal year 1971, no new traineeships were granted because the indicated need for special incentives in this area has considerably diminished. The traditional program of NSF graduate fellowships has been continued, however, but at a slightly reduced scale.

Among the ongoing Foundation programs in science education, we expect in the College Science Improvement Program to provide specific opportunities for colleges and universities historically directed toward the education of racial minority groups. We are continuing support training for science teachers and supervisory personnel, together with coordinated State, local, and private efforts for Statewide or regional approaches to improving science education.

My comments cover only the highlights of events during the past fiscal year that indicate how the Foundation has reoriented and redirected its energies at the outset of the transitional decade. During the past year, we have made progress in responding to the needs of the whole of our society, its environment, and the growth of the individuals who make it up. In so doing, we have had to make many hard choices. It is too soon to say that we have delivered what we have promised. But we have begun a period of growth which is dynamic. If it is to continue, this growth must be based on a broader and better informed American public. The informed citizen of the future cannot be indifferent to the impact of science on his life. At the same time, the scientific community must be more sensitive to the spirit of the times. The scientist's faith in knowledge for the sake of understanding must

increasingly include the concept of conscience, which includes and is greater than the word "science." This we have begun in the past year.

I have resigned as Director of the National Science Foundation, effective in February 1972, to become Chancellor of the University of California, San Diego. During my tenure as Director of the National Science Foundation, I have tried to serve the needs of the nation and the scientific community. No man can accept such a task without a keen sense of its importance, nor with any hope of success without the help of dedicated and competent colleagues. I am grateful to the National Science

Board for their counsel, and the staff of the National Science Foundation for their effective and loyal support. They have my warmest thanks.

In my relations with the Congress and within the Executive Branch, I have met an openmindedness, sincerity, and cooperation which has made my term memorable for me as an individual—and, I believe, beneficial for science and the nation. In this last Director's Statement that I will make for the Foundation, I express my gratitude and my hope that the forward movement of the National Science Foundation and science will continue to enrich human life in the years ahead.