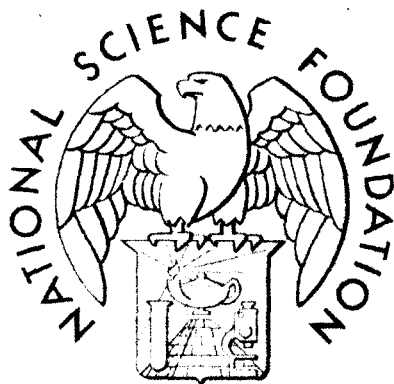


February 1957

National Science Foundation

6th Annual Report, 1956



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National Science Foundation

*Sixth Annual Report for the
Fiscal Year Ended June 30, 1956*



LETTER OF TRANSMITTAL

WASHINGTON, D. C.

November 1, 1956.

MY DEAR MR. PRESIDENT:

I have the honor to transmit herewith the Annual Report for Fiscal Year 1956 of the National Science Foundation for submission to the Congress as required by the National Science Foundation Act of 1950.

Respectfully,

ALAN T. WATERMAN,

Director, National Science Foundation.

The Honorable

The President of the United States.

CONTENTS

	Page
Letter of Transmittal	III
The Chairman's Foreword	vii
The Director's Statement	xi
The Sixth Annual Report—A Summary	xv
RECENT DEVELOPMENTS AFFECTING THE SCIENTIFIC COMMUNITY	
Surveys of the Nation's Scientific Potential	1
Considerations of Loyalty in Relation to Government Support of Unclassified Research	9
Science and Scientific Manpower in the U. S. S. R.	12
The National Committee for the Development of Scientists and Engineers	17
Recruiting and Retaining Scientific Personnel in Government Service	20
The International Geophysical Year	22
Federal Policy on the Conduct and Support of Research and De- velopment in Synthetic Rubber	28
A PHOTOGRAPHIC SAMPLING OF FOUNDATION ACTIVITIES	31
PROGRAM ACTIVITIES OF THE NATIONAL SCIENCE FOUNDATION	
The Research Report	44
The Facilities Report	54
The Manpower Report	61
The Communications Report	76
Conferences in Support of Science	83
APPENDICES	
A. National Science Board, Staff, Committees, Commissions, and Advisory Panels	97
B. Research Support Programs	112
C. Grants Other Than Research	146
D. Fellowship Programs	152
E. Grants for International Geophysical Year Program	179
F. Financial Report	185
G. Publications of the National Science Foundation	187

THE CHAIRMAN'S FOREWORD

The 10 years since the end of World War II have been a dramatic decade in the development of science in the United States. New discoveries of natural knowledge and its application at an unprecedented rate have strengthened our military defenses, stimulated our national economy, and bettered human welfare; new vistas of better ways of life have been revealed. These remarkable achievements have been enabled in large degree by the greatly increased financial support of scientific research and teaching by our Federal Government and by private industry. The National Science Foundation has done much to foster those developments. The Foundation has even heavier responsibilities and greater opportunities in the years ahead in order that our accelerating scientific progress may be sustained by the discovery of new knowledge and by the enthusiasm of newly trained scientists.

Heartening recognition of those responsibilities and opportunities by the Federal Government has been evident in the ever-increasing appropriations for the work of the Foundation. The need for further support will certainly increase if our Nation is to preserve the vitality we have inherited from our pioneering ancestors and which is nurtured by adventurous research. Science satisfies man's deep-seated desire to create a more satisfying way of life. Science is necessary to national survival in the fierce conflict of spiritual ideals and national economies.

In this scientific age it is more true than ever before that trained minds are our greatest sources of power and our most powerful weapons. The mission of the National Science Foundation is to prepare the minds of young scientists for the high purpose of research and to provide the facilities they require for their subsequent endeavor. Appropriations for such

a purpose are secure investments in the future of our country and in the welfare of its people.

Scientists traditionally have cultivated close associations with colleagues of other countries. It is natural that they should do so, for scientists of all nations are engaged in a common quest for common knowledge; the work of each is aided by knowledge of the work of others. Such associations and community of effort are of especial significance in these times of international dissidence and danger which emphasize the greater need for amity of nations.

Scientists are uniquely fitted to foster international unity and friendship, for they deal with facts and natural laws which are not modified by national boundaries. As scientific ambassadors they are not involved in the disputes of nations; they are effective cohesive forces in a world that is fragmented by divisive forces.

With increasing effort this Foundation fosters the diffusion of scientific knowledge between nations and aids our scientists to visit laboratories and colleagues in other countries; the Foundation has thus strengthened our country's ties to other friendly countries. By enabling our scientists to play a more active role in the international scientific community, we have helped fulfill the growing responsibility that derives from our country's position of pre-eminence in modern science. Our support of the vast undertakings which are planned for the International Geophysical Year is such a vital endeavor. By all exchange of scientists and scientific knowledge, "science is increased to the benefit of mankind in general" to quote the words of Benjamin Franklin. If our national goals were small and selfish, such support of international activities would be materially profitable; if we are magnanimous in our concept of national duty, to foster such relations is essential.

The surest measure of a nation's greatness is the moral and intellectual quality of its people. In this age of science a great national resource is an abundance of scientists who are teachers, investigators, writers, administrators, and those who apply new knowledge to the satisfaction of human wants. Such an

abundance we do not have; on the contrary, the scarcity of trained scientists is acute. To relieve that shortage which restricts our scientific progress is one of the present concerns and efforts of the Foundation.

We recognize a responsibility for the teaching of science which goes far beyond the training of scientists alone. We would further the better teaching of science so that all the citizens of our country may understand science more adequately in order that they can more effectively fulfill their responsibilities as citizens of our democracy. Unless there be such a widespread understanding of the scientific determinants of our civilization, our Nation will be rent by conflict between those who know and those who do not know.

The National Science Foundation is remarkable for the vast number of those who carry out its functions in all parts of our country. A small administrative organization relies upon the freely given advice and expert judgment of thousands of scientists drawn from universities and other research institutions and from industrial and Government laboratories. On their advice funds are granted for the work of scientists and teachers in universities, colleges, and schools in every state of the Nation. The freedom and integrity of our private cultural institutions are thus preserved. The culture of every state in the Union is thus enriched. It is truly a *National Science Foundation*.

DETLEV W. BRONK,
Chairman, National Science Board.

THE DIRECTOR'S STATEMENT

The nations of the world recognize the importance of progress in science and technology to economic and military strength. This recognition is a strong stimulant in their promotion of industrial research, development, and production; in their support of basic research underlying such efforts; and in their provision for training of scientists and engineers. All of them recognize that technological accomplishment depends on skill and experience in production, supported by applied research and development sufficiently financed, resting on a strong foundation of basic research. To these ends, an adequate and continuing supply of competent scientists, engineers, and technicians is indispensable.

Our technology is strong in experience and preparedness to cope with sudden and large demands upon it, both industrial and military. Its facilities are advanced, efficient, and extensive, and there is no lack of drive and energy in putting them to work. Our weakness has been in developing a sufficient number of adequately trained scientists and engineers, and in providing sufficient support for those capable of doing the basic research needed for technological advancement. The shortage of such personnel is critical.

Our educational system has established a truly remarkable record in providing general training for our children through high school. However, for the purpose of training scientists and engineers or, for that matter, other professional specialists, this record is spoiled in the transition from secondary school to college—about half our ablest young people do not go on to college. Contrary to popular opinion, the chief difficulty appears to be primarily not financial, but rather a lack of motivation toward pursuing further education, or a

deliberate choice in favor of an immediate job which will provide a satisfactory income and a promising future. There is thus a need for improved counselling of high school students.

Lack of interest or motivation in the sciences and engineering is but one part of a much larger problem. The potentialities of a college education in developing skills and aptitudes for most professional careers are simply not understood. Managers of technical industries know that the years of specialization in science and engineering lead to more rapid advancement and to far more opportunities in rewarding employment. We must emphasize that making the most of one's opportunities to develop professional aptitudes is in the best interest of the individual and in the best interest of society. He who aspires to a successful career in the fields of science and technology must now, more than ever before, be thoroughly grounded in the fundamental sciences underlying his specialty so that he may keep pace with the increasingly rapid advances in technology.

In the American economy, the need to develop professional competence extends across all fields of knowledge, whether in the arts or in the sciences. However, the need is particularly critical today in science and engineering. Shortages here directly affect, in immediate practical ways, our capabilities for defense and for the industrial progress so necessary to our strength and welfare.

The widely publicized need for scientific and engineering manpower is beginning to evoke the interest in young people in such careers. If the current demand continues and strong efforts are exerted to fill these needs, the output of trained scientists and engineers will markedly increase. However, these increasing numbers may be expected to be more interested in research and the practice of science and engineering than in teaching, although it is obvious that more and better qualified teachers are needed to keep up with the growing numbers of students. To provide the teachers poses a difficult problem. To incline the younger generation towards a teaching career in science can hardly be successful, until such a career is attractive in terms of salary and professional prestige.

Most helpful and important is the current interest taken by industry in training scientists and engineers. Many technical industries are now performing valuable service in providing fellowships and scholarships, funds for research, opportunities for training, and direct stimulation for improvement of science education in secondary schools and colleges. Likewise, scientific societies and associations can be most helpful. The President's Committee for the Development of Scientists and Engineers is taking steps further to encourage and stimulate activity by the interested organizations—scientific, industrial, and labor, as well as state and municipal governments.

In the United States, support of education is by tradition a matter of local concern, with funds provided by the states and municipalities, and by private sources. Educational support is, above all, responsive to the wishes of parents and citizens. When parents and citizens realize fully the extent to which our future depends upon the competence of our teachers, conditions will rapidly improve.

Support of basic research among colleges and universities is closely linked to the immediate output of trained scientists and engineers, since funds for research are commonly used to employ graduate students as research assistants. Thus, additional support for basic research in colleges provides advanced research training for more graduate students who will complete their training and be available within one or two years.

To the increased need for basic research and the training of scientists, we must add the urgent need for general research equipment to supplement and replace the obsolete equipment now in use. For that matter, there is a great need to renovate research facilities of all kinds at colleges and universities. Even more extensive is the need for equipment for instructional purposes, both for laboratory and demonstration use—a need felt in all colleges, but probably most acutely in the secondary schools. Better laboratories and scientific equipment would prove a great asset for recruiting desperately needed science teachers in the elementary and secondary schools.

Perhaps the most critical question is: can these widespread needs of science in our educational institutions be met adequately and quickly in the customary way by local support,

from state, municipal, or private sources? Indeed, our national welfare depends in considerable degree upon the promptness and thoroughness with which we can assure the maintenance of a strong scientific research effort and an adequate supply of trained scientific manpower. A major consideration is the degree to which the Federal Government should participate in the solution of these most urgent problems. The most important goal is to create an awareness and an understanding on the part of our citizens regarding the fundamental and critical nature of these problems, in order that speedy progress may be made toward their solution.

ALAN T. WATERMAN,
Director, National Science Foundation.

THE SIXTH ANNUAL REPORT—A SUMMARY

This summary describes, in brief, each of the subjects covered in detail by the Sixth Annual Report. Page numbers are indicated for those who desire to read the more complete report.

Recent Developments Affecting the Scientific Community

Surveys of the Nation's Scientific Potential.—With publication during the fiscal year of four monographs on amounts, kinds, and costs of scientific research in the United States, the Foundation provides further information about the Nation's scientific research and development activities. These publications were *Science and Engineering in American Industry*, *Scientific Expenditures by the Larger Private Foundations*, *Research by Cooperative Organizations*, and *Federal Funds for Science*.—Other surveys in preparation are discussed. Prepared under the direction of the Foundation's Office of Special Studies, these studies provide sound statistical bases on which Federal science programs and policies can be developed. (p. 1.)

Considerations of Loyalty in Relation to Government Support of Unclassified Research.—The Administration outlines the practices which will be followed by the departments and agencies of the Government with reference to grants or contracts for unclassified scientific research. (p. 9.)

Science and Scientific Manpower in the U. S. S. R.—United States science is seen against a perspective of Soviet technological advances. Nicholas DeWitt's book, *Soviet Professional Manpower*, published and widely circulated by the Foundation and the National Academy of Sciences, provided data about the role of education and training in contributing to large-scale advances in Soviet technology. (p. 12.)

The National Committee for the Development of Scientists and Engineers.—President Eisenhower establishes a citizens' action committee, with staff support from the Foundation, to stimulate nongovernmental programs for the development of well-qualified scientific manpower to meet the United States economic, health, and defense needs. (p. 17.)

Recruiting and Retaining Scientific Personnel in Government Service.—Problems of recruitment of scientists and engineers for Federal employment, their retention in Government, their salary schedules, and their status generally are cause for concern. (p. 20.)

The International Geophysical Year.—Over 50 nations of the world will cooperate in a vast worldwide study of man's physical environment during the IGY, mid-1957 to the end of 1958. Progress of the United States program during fiscal year 1956 is described. (p. 22.)

Federal Policy on Conduct and Support of Research and Development in Synthetic Rubber.—The United States Government withdraws from the special support of synthetic rubber research and is disposing of the Government laboratories at Akron, Ohio, following congressional approval of such disposal. (p. 28.)

A Photographic Sampling of Foundation Activities

Often a picture conveys meaning better than words. Here an attempt has been made to show graphically something of the content of each of the major programs of the Foundation—from scenes characteristic of the environment of basic research, to science-minded teen-agers browsing among the books of a traveling science library.

Program Activities of the National Science Foundation

The Research Report describes the program of two divisions of the Foundation—the Division of Biological and Medical Sciences, and the Division of Mathematical, Physical, and Engineering Sciences—during fiscal year 1956. These divisions supported basic research through 734 grants totaling over \$9.6 million, in 258 institutions, located in 47 States, the District of Columbia, Hawaii, Puerto Rico, and a small number of foreign countries. (p. 44.)

The Facilities Report.—The Foundation started to provide financial support for the establishment of new facilities urgently required for basic research as well as support for existing special-purpose research facilities. Facilities supported during fiscal year 1956 or projected for support during the period ending June 30, 1957, include a radio astronomy facility, an optical astronomical observatory, nuclear research reactors, high speed computers, and biological field stations. (p. 54.)

The Manpower Report describes the work of the Division of Scientific Personnel and Education with particular reference to its program of institutes for high school and college science teachers, and of its fellow-

ship programs. The latter provided 775 graduate fellowships for students studying for advanced degrees in the sciences, 80 postdoctoral fellowships for scientists engaged in postdoctoral training and research, and 40 senior postdoctoral fellowships for more advanced and mature scientists than those who have but recently received their doctorate. (p. 61.)

The Communications Report describes the work of the Office of Scientific Information in making research results more widely accessible to scientists everywhere. Objectives are achieved essentially through:

1. Making the results of foreign scientific research available to American scientists.

2. Establishment of more effective machinery to enable scientists to locate and obtain results of unclassified Federal scientific research.

3. Support of research directed toward improving methods of documenting results of scientific investigation.

4. Emergency support of current scientific publications and reference tools.

5. Enabling American scientists to attend important international scientific meetings. (p. 76.)

Conferences in Support of Science presents a brief synopsis of each of the 29 conferences of scientists for which the Foundation provided partial support during fiscal year 1956. Such conferences serve as an effective clearinghouse and catalyst for exchange of ideas and information among scientists, many of whom are drawn from other nations, working in new and incompletely explored fields. (p. 83.)

Recent Developments

Affecting the

Scientific Community

SURVEY OF THE NATION'S SCIENTIFIC POTENTIAL

Amounts, kinds, and costs of scientific research must be known when agencies and organizations plan programs and develop policies for research and development. Down to 1955, the roughly estimated total expenditure for scientific research and development in the United States was about \$3 billion to \$3.5 billion. Based on statements from 10,000 business enterprises, and on estimates of costs of research conducted by educational institutions, Government agencies, and other types of research organizations—all of whose officials generously cooperated in completing a survey sponsored by the Foundation—United States expenditures for all research and development for the survey period 1953, were not \$3.5 billion, but well over \$5 billion.

Of this total, private industry alone expended \$3.7 billion, of which \$1.4 billion (37%) represented work done for the Federal Government. Although private industry's contribution to the support of basic research was reported as nearly \$150 million, this represented only 4 percent of the total expenditure by private industry in 1953 for all research and development.

Science and Engineering in American Industry

The Foundation's Office of Special Studies brought many facts out of the jungle of speculation early in fiscal year 1956 with publication of the monograph, *Science and Engineering in American Industry*, a preliminary report on a survey of research and development costs and personnel in 1953-54. Data for the publication were assembled by the Bureau of Labor Statistics, United States Department of Labor, under a grant from the Foundation. A final and more comprehensive report, containing descriptive and analytical materials based on personal interviews with industrial research executives as well as on statistical inquiry, is scheduled for publication during fiscal year 1957.

Broken down by scientific fields, industrial firms reported their basic research as predominantly in the physical sciences—such as chemistry, engineering, physics, and metallurgy—which received over 90 percent

of their total basic research funds. Less than 10 percent was reported for the life sciences—medical, agricultural, and biological.

The survey disclosed that companies in the electrical equipment and aircraft categories exceeded all others in the dollar volume of their research and development—together accounting for \$1.5 billion of the \$3.7 billion total for industrial firms. (See figure 1.) The chemical industry surpassed all others in dollars expended for basic research.

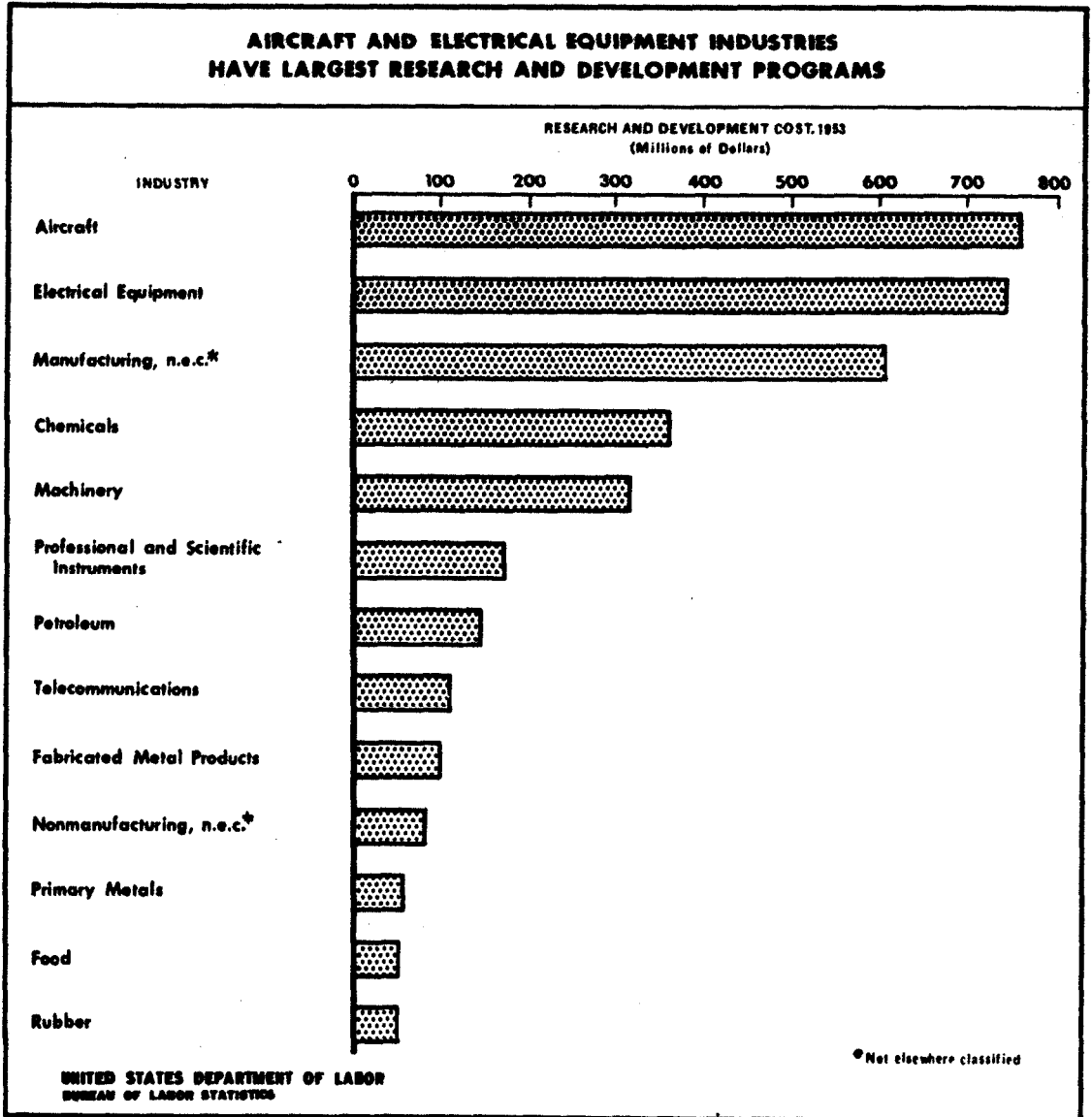


Figure 1.—Cost of research and development program by industry.

Of the 554,000 scientists and engineers employed by the surveyed industries in January 1954, the largest groups included 409,000 engineers, 60,000 chemists, 11,000 metallurgists, 10,000 life scientists, 10,000 earth scientists, 8,000 physicists, and 6,000 mathematicians. Included, as well, were about 34,000 scientists and engineers classified by their companies as administrators. Of this total, only about 157,000 scientists and engineers—30 percent—were engaged in research and develop-

ment, including approximately 105,000 engineers, 27,000 chemists, and much smaller numbers in other fields of science.

The survey found that more than 15,000 companies contributed to the Nation's research and development effort. Of these about 13,000 or 85 percent, employed less than 500 persons each. Cost figures show, however, that this large group of small companies performed only about one-tenth of all industrial research and development, whereas the 375 largest companies (with 5,000 or more employees) performed about 70 percent. These data are exclusive of enterprises employing less than 8 persons and of individuals working alone, as well as of scientific and engineering consulting firms and a few other types of organizations.

Science Research Support by Private Foundations

Disbursement of Government funds for whatever purposes should be directed to meet broad areas of economic or social need not adequately supported by private enterprise. Until statistics were gathered by the Russell Sage Foundation, and published in fiscal year 1956 under arrangement with the National Science Foundation, a comprehensive account of the kinds, amounts, and dollar values of scientific research supported by the larger private foundations was not available. Data for the study were assembled without cost to the National Science Foundation, and made public in a second monograph, *Scientific Research Expenditures by the Larger Private Foundations*, issued during the past fiscal year by the National Science Foundation.

Research by Cooperative Organizations

Although the dollar value of scientific research support by trade associations and professional technical societies is not large, the influence of these groups may be considerable upon the policies and practices of the organizations they represent. A third monograph, *Research by Cooperative Organizations*, published by the National Science Foundation during fiscal year 1956, produced statistical data on scientific research by trade associations, professional and technical societies, agricultural cooperatives, and research-educational cooperatives. The report was prepared for the Foundation by the Battelle Memorial Institute.

The picture of the basic and applied research and the development activities of the industrially orientated sector of the research community will be rounded out, during fiscal year 1957, with publication of a monograph on the work of nonprofit research institutes and of those commercial laboratories which conduct research.

Federal Funds for Science

Research and development supported by the Federal Government has undergone a marked increase in recent years in relation to total Federal expenditures. Accounting for 1 percent of the total budget in 1940, scientific research and development was responsible for 3 percent, or \$2.1 billion in fiscal year 1955, out of Government outlays of \$63.5 billion for all purposes.

These facts were shown in the fourth issue of *Federal Funds for Science*, prepared by the Office of Special Studies and released by the Foundation during fiscal year 1956. Federal support of research and development is described in terms of administering agencies, scientific fields covered, and character of work performed.

Although more than 20 of the 56 departments and agencies of Government administer funds for scientific research and development, the Department of Defense alone accounts for about 70 percent of the total. Funds administered by the Defense Department amounted to over \$1.5 billion in fiscal year 1956. Ranking next to the Department of Defense is the Atomic Energy Commission. When funds administered by five other agencies—the National Advisory Committee for Aeronautics, and the Departments of Agriculture; Health, Education, and Welfare; Interior; and Commerce—are added to those of the Department of Defense and the Atomic Energy Commission, more than 97 percent of the total Federal research and development budget is accounted for. (See figure 2.)

The mathematical, physical, and engineering sciences received 85 cents of each dollar obligated by the Government for the conduct of research and development in fiscal year 1954. Ninety-three percent, or \$1.6 billion, of the Federal Government's obligations budgeted to conduct research and development in fiscal year 1954 was for applied research and development. *Less than 7 percent, or \$116 million, went into basic research.* As noted above, private industry reported the expenditure of \$150 million in 1953 to support basic research in the sciences.

Other Surveys Underway or in Process of Publication

During the past year, the Foundation completed a monograph entitled *Organization of the Federal Government for Scientific Activities* which is the first comprehensive account of Federal organization for such activities since 1947. (See figure 3.) It is of particular interest because it documents the marked increase in research and development activities in Government. (This publication was released during August 1956.)

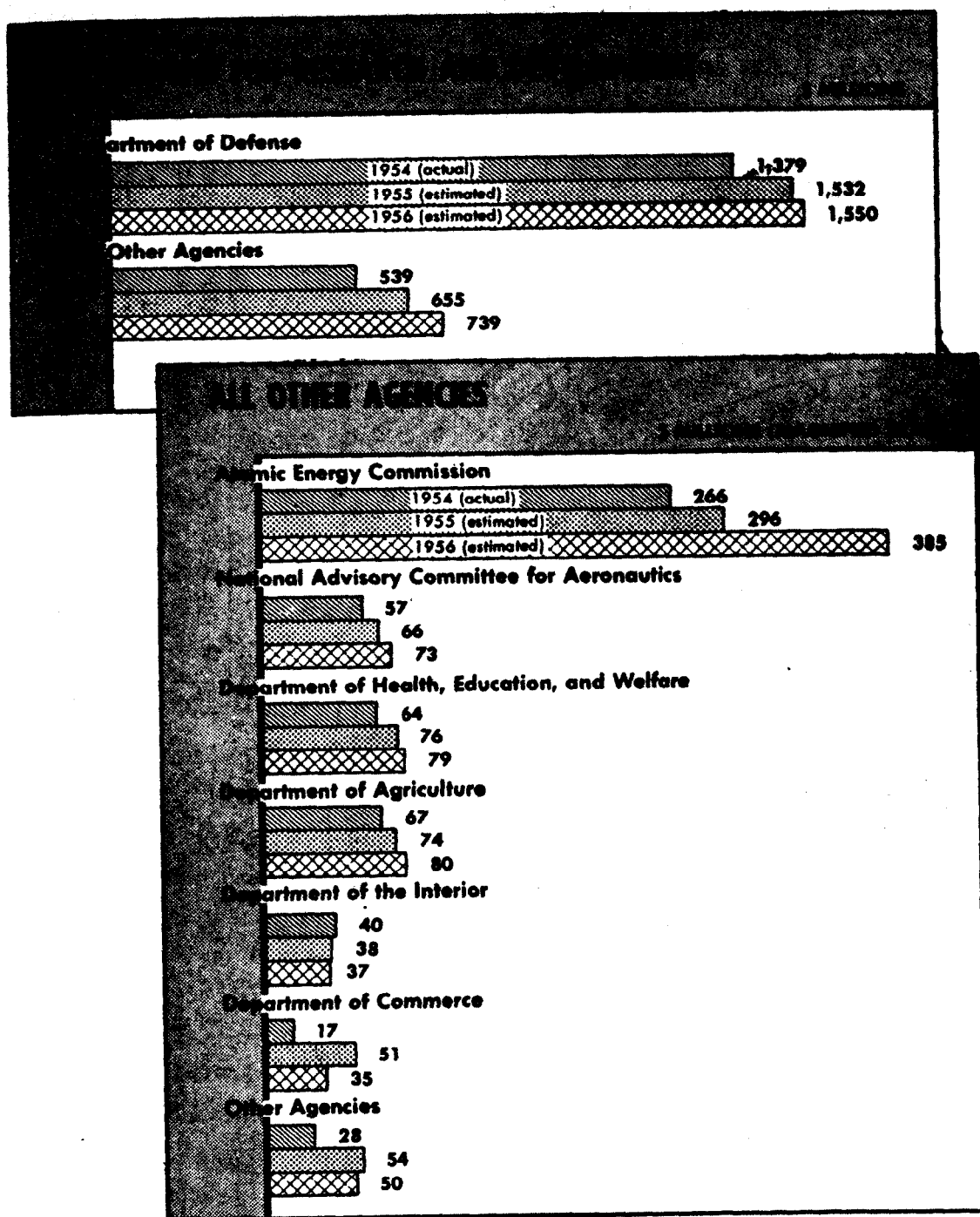


Figure 2.—Obligations of the Federal Government for research and development by department and agency.

Another study completed during this year was *Federal Support for Science Students in Higher Education*. (See figures 4 and 5.) The information contained in this report on the present Federal programs which support higher education in the sciences should prove of considerable assistance in evaluating the many proposals for Government-financed scholarship and fellowship programs in the sciences. (This publication was released during September 1956.) A companion study was also well underway during 1956. This was a survey of graduate

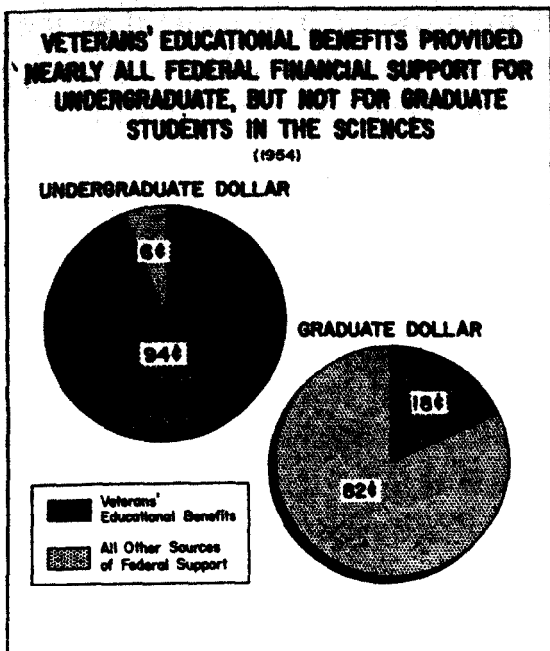


Figure 4.—Amount of the Federal support dollar provided through veterans' educational benefits at the undergraduate and graduate college level.

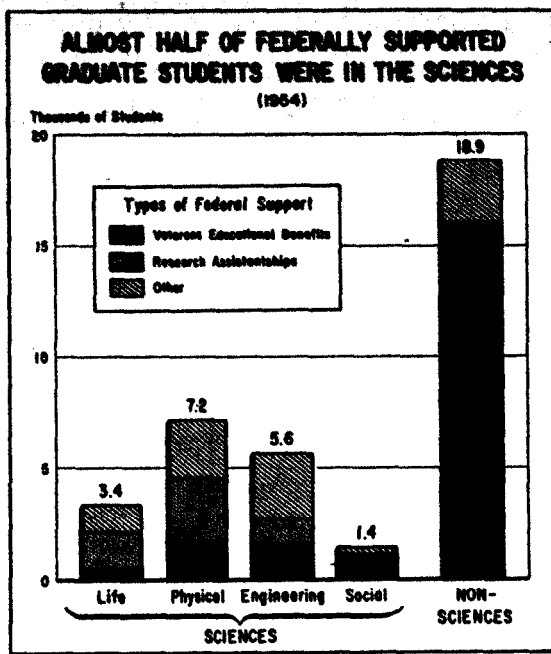


Figure 5.—Federal support of graduate students by field and type of support.

student enrollment, higher degrees granted, and financial support for graduate students.

A historical study of the growth of Federal scientific activities from Colonial times to World War II was prepared under contract with the Foundation by Dr. A. Hunter Dupree of Harvard University. It is entitled *Science in the Federal Government, a History of Policies and Activities to 1940* and will be published by the Harvard University Press in February 1957.

Portions of a pilot study of the scientific activities of State governments were also completed under contract with the University of North Carolina during fiscal year 1956. Reports were received on 4 of the 6 States taking part in the study. The four are: New York, Wisconsin, New Mexico, and Connecticut. This study will provide a picture of the role of State governments in scientific activity.

New Knowledge About Total United States Scientific Research Effort

Thus, fiscal year 1956 saw the beginning of the public presentation of what is probably the most complete overall factual reporting of the Nation's scientific research and development effort during a given year. Public officials, educators, scientists, industrialists, and the press will have available, as time goes on, a broader and more accurate picture than was previously available for this mainspring of American culture and technology.

Experience gained in the course of inquiries such as those described above will indicate fruitful lines of analysis to meet the need for knowledge about our Nation's scientific research and development activities.

CONSIDERATIONS OF LOYALTY IN RELATION TO GOVERNMENT SUPPORT OF UNCLASSIFIED RESEARCH

One of the basic objectives of the National Science Foundation is the promotion of progress in science. For this reason the Foundation is vitally concerned with the relationship between the Federal Government and American scientists. If this relationship is not healthy, and results in mutual distrust, scientific progress is retarded. The Nation is deprived of the fruits of much research and the scientist of a source of support needed for his investigations.

Therefore, in keeping with fundamental concepts of justice and freedom, and in fairness to the scientific community, the Foundation early in its career determined that:

In appraising a proposal submitted by or on behalf of a scientist for the support of unclassified research not involving considerations of security, the Foundation will be guided as to an individual's experience, competence, and integrity by the judgment of scientists having a working knowledge of his qualifications. However, the Foundation does not knowingly give nor continue a grant in support of research for one who is—

1. An avowed Communist or anyone established as being a Communist by a judicial proceeding, or by an unappealed determination by the Attorney General or the Subversive Activities Control Board pursuant to the Subversive Activities Control Act of 1950, or anyone who avowedly advocates change in the United States Government by other than constitutional means, or
2. An individual who has been convicted of sabotage, espionage, sedition, subversive activity under the Smith Act, or a similar crime involving the Nation's security.

Furthermore, if substantial information coming to the attention of the Foundation indicates that a potential or actual researcher might be guilty of violation of any such law, the information will be forwarded to the Department of Justice for its consideration.

The policy of the Foundation was endorsed by the American Association for the Advancement of Science at its Berkeley meeting in December 1954.

During the past year, Sherman Adams, the Assistant to the President, requested Detlev W. Bronk, President of the National Academy of Sciences, to appoint a committee to survey the whole problem and report its findings to him. Dr. Bronk appointed the following Committee on Loyalty in Relation to Government Support of Unclassified Research:

Chairman: J. A. Stratton, Vice President and Provost (now Chancellor), Massachusetts Institute of Technology. Members: Robert F. Bacher, Professor of Physics, California Institute of Technology; Laird Bell, Attorney, Chicago, Ill., Wallace O. Fenn, Professor of Physiology, University of Rochester, Robert F. Loeb, Bard Professor of Medicine, College of Physicians and Surgeons, Columbia University; E. Bright Wilson, Jr., Professor of Chemistry, Harvard University; and Henry M. Wriston, President, Brown University.

Recommendations of the Committee were as follows:

1. The test in the award of (Government) grants and contracts for unclassified research should be the scientific integrity and competence of the individuals responsible for carrying out the research, and the scientific merits of their program.

2. When an official of the Government comes into possession of evidence which in his opinion indicates the possible existence of disloyalty in violation of law, he should promptly refer that information to the Federal agencies of law enforcement established to deal with such matters.

3. An allegation of disloyalty should not by itself be grounds for adverse administrative action on a grant or contract for unclassified research by scientifically competent investigators; if the indications of disloyalty appear sufficiently serious to warrant any action at all, the Government in the opinion of the Committee has no other course than to bring formal charges and to produce the evidence in open hearing before legally constituted authority.

The report of the Committee, submitted to Governor Adams by Dr. Bronk, was made public shortly after the end of fiscal year 1956. In his acknowledgment, Governor Adams said in part:

The report of the Committee on Loyalty in Relation to Government Support of Unclassified Research has been carefully studied by the executive departments and agencies which

are primarily involved in this problem. The principles set forth in the recommendations of the report have generally been found satisfactory as a basis for actions regarding grants or contracts for unclassified scientific research. It is noted that these principles are essentially those which support the policy of the National Science Foundation. The departments and agencies will, therefore, follow practices consistent with the recommendations contained in the report of the Academy's Committee.

SCIENCE AND SCIENTIFIC MANPOWER

IN THE U. S. S. R.

Since the death of Stalin, there have been many indications that scientists in the U. S. S. R. are being allowed to renew contacts with the international community of science. The past year in particular was marked by a freer exchange between scientists of the U. S. S. R. and other nations than any time in recent years. Russian scientists have appeared more frequently at international meetings and conferences and a number of invitations to scientific meetings within the Soviet Union have been extended to Western scientists as well as to scientists of satellite nations. In February 1956, about a dozen American physicists were invited to attend a conference on high energy physics to be held in Moscow in May, and three Russian physicists attended the Sixth Annual Conference on High Energy Physics at the University of Rochester. The U. S. S. R. was admitted to membership in the International Council of Scientific Unions in August 1955, and is participating extensively in the research programs of the International Geophysical Year.

Because of lack of knowledge in this country concerning the scientific manpower resources of the U. S. S. R., Nicholas DeWitt undertook a study, sponsored jointly by the National Science Foundation and the National Academy of Sciences-National Research Council, which has resulted in the publication of *Soviet Professional Manpower*. This is the first book that pulled together all known facts on the deployment and utilization of Soviet professional manpower.

Interest in *Soviet Professional Manpower* is an encouraging sign of desire by Americans to be better informed about what is going on in other countries. Because few American scientists understand Russian, they tend to overlook literature published in that language, despite the fact that in recent years there is increasing evidence that Russian science cannot be ignored.

The National Science Foundation provided travel grants that enabled a small group of American physicists to attend the conference on high energy physics in Moscow in May. Upon their return, they gave uniformly commendatory accounts of the competence of Russian physicists. To quote from one of them:

The Soviet scientists are capable, well trained, and well informed scientifically. They are for the most part better informed on both American and Soviet scientific literature than are most of the corresponding people in America. There can be no question that they are up to date on the American literature. (I am very pleased to hear that the *Doklady* as well as the *Journal of Experimental and Theoretical Physics* will henceforth routinely be translated into English.)

The translation program mentioned is another effort on the part of the National Science Foundation to make significant scientific findings freely available to American scientists, despite language barriers. (See p. 80 for fuller description of this program.)

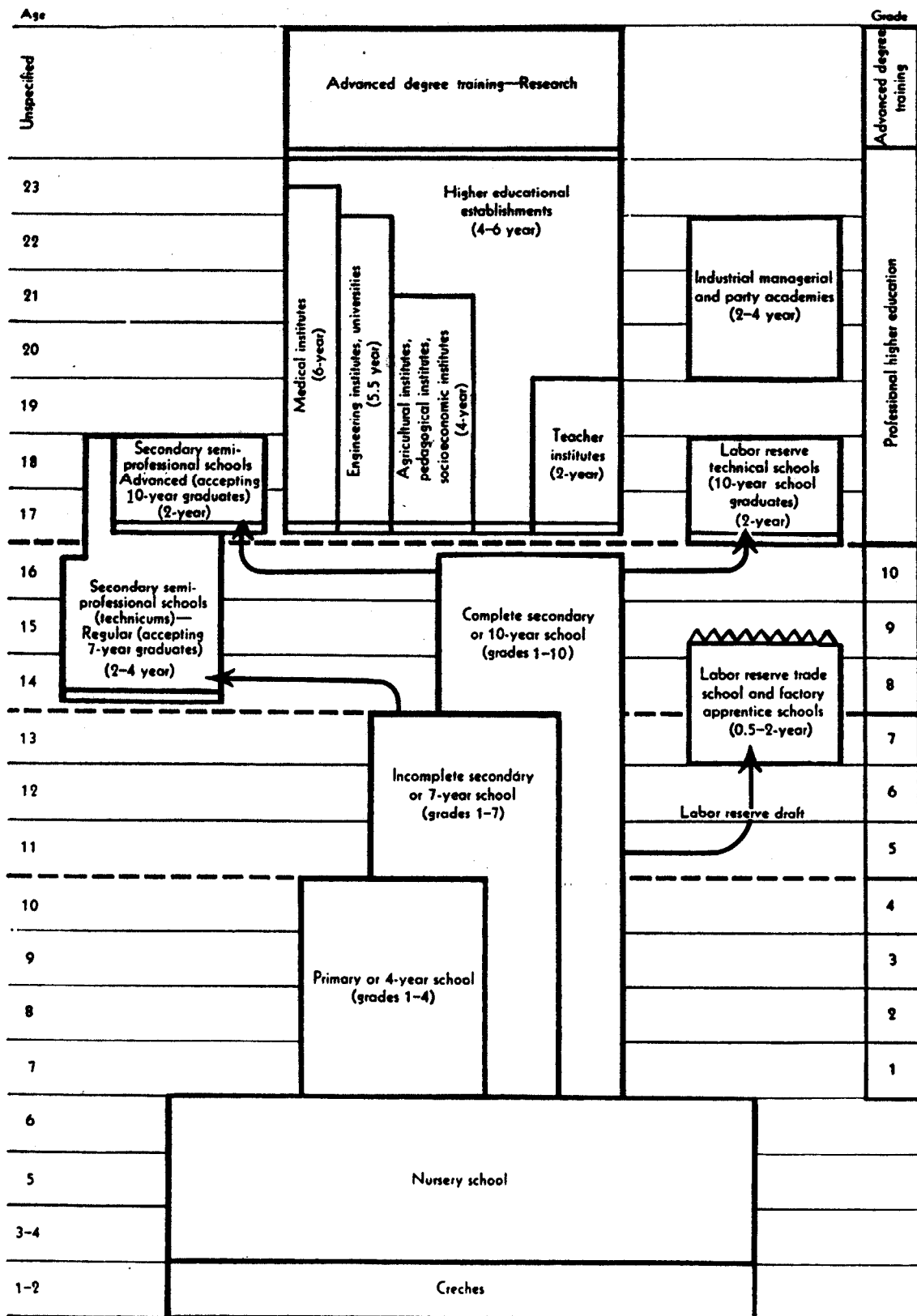
Although the U. S. S. R. is producing scientists and engineers at a higher rate than the United States (about $2\frac{1}{2}$ times as many science field graduates and nearly 3 times as many engineers in 1955), there is great need to see the problem in its proper perspective. As Dr. Lee DuBridge, President of the California Institute of Technology, told members of the National Committee for the Development of Scientists and Engineers last June:

It is true that in Russia more men and women received degrees in science and engineering last year than in the United States. So what? Maybe that is because in the past 100 years they have so neglected their technical strength that they must now exert strenuous efforts to build it up. If this is true, then our rate of production should not be determined by their weakness—only by our own. Let us ask how many engineers we need to do our job, and not take over their figures for the numbers they require to do their job.

Soviet Professional Manpower is a careful exposition of the Soviet educational system. It is accompanied by statistical data in tabular and chart form. The book shows that the Russians are seeking to improve their educational system to the point where it is capable of producing all the skills their growing economy demands. They have apparently concluded that they need scientists and engineers more than anything else, so a system of incentives and awards, coupled with highly disciplined training in these fields, has been developed to promote training of scientists and engineers at a high rate. (See figure 6.)

The United States has for years maintained a position of leadership in technology. It now appears that such leadership can no longer be taken for granted. We do not wish to be forced into a position of competition with the U. S. S. R. on its own terms; but Russian emphasis on science and mathematics, particularly in secondary schools, lends added weight to the need for scrutinizing our own educational system closely.

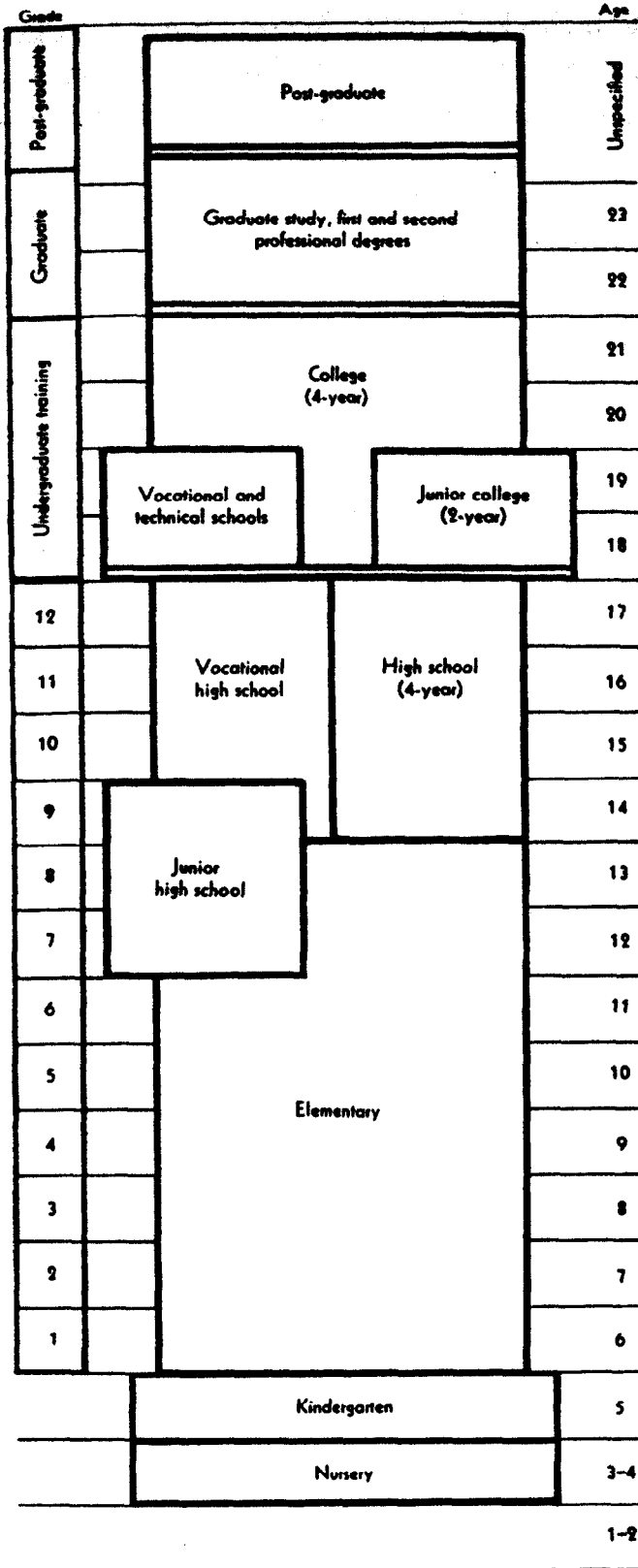
UNION OF SOVIET SOCIALIST REPUBLICS






Source: Nicholas DeWitt, *Soviet Professional Manpower*, U. S. Government Printing Office, Washington, 1955.

Figure 6.—Structure of the Soviet educational

UNITED STATES



SYMBOLS

-  Indicates the origin of the applicants.
-  No further access except through supplemental secondary education.
-  Acceptances on the basis of competitive entrance requirements.

system compared with that of the United States.

Another American physicist, commenting on his observations of education in the U. S. S. R., noted that the U. S. S. R., in common with other nations of Europe, lays great stress on thorough training in secondary schools. Students emerging from secondary schools in European countries are generally well prepared in languages and mathematics as well as in science, so that when they approach the university, they are ready to specialize in their chosen subject.

There is some evidence of widespread relaxation of requirements in American secondary schools for such subjects as languages, mathematics, and the sciences. Many students attracted to the study of science in college find that they have been inadequately prepared to pursue studies in fields that require thorough grounding in mathematics. A sober reappraisal of secondary school training in science and mathematics may be in order as a guide to the extent this country may fall short of achieving its high potentialities.

THE NATIONAL COMMITTEE FOR THE DEVELOPMENT OF SCIENTISTS AND ENGINEERS

Functions and Program

The National Committee for the Development of Scientists and Engineers was brought into being on April 3, 1956, by President Dwight D. Eisenhower. Membership of the National Committee includes representatives from the fields of engineering, science, education, management, labor, State, and local governments, and the humanities. In a letter to Dr. Howard L. Bevis, Chairman of the National Committee, the President charged the Committee as follows:

It is my hope that the Committee will—

1. Assist the Federal Government in identifying the problems associated with the development of more highly qualified scientists and engineers.

2. Enlist the cooperation of all interested individuals and groups in analyzing the problem and developing programs to deal with it, and to take the lead in coordination of interested organizations outside the Federal Government.

3. Make available to all interested organizations information on effective ways of overcoming the obstacles to the training of more qualified scientists and engineers.

4. Publicize the problem and possible solutions in order to stimulate widespread public understanding and support.

In setting up the Committee, the President requested the National Science Foundation to supply staff services and to provide leadership to other departments and agencies in carrying forward activities which will contribute to a solution of the assigned problems.

Work in Progress

The National Committee held its first meeting on May 15, 1956. At this first meeting the Committee, in addition to determining its method of operation, organized two working groups. The first group was to develop a program looking toward increasing the number and improving the quality of engineering and scientific technicians. The second

group was to explore ways and means of encouraging the long-range improvement of science and mathematics programs in the elementary and secondary schools.

These working groups reported at the second meeting of the Committee on June 21–22, 1956.

The working group concerned with scientific and engineering technicians developed a number of recommendations to expand the available supply of qualified technicians. These include:

1. More widespread recognition of the capabilities of technicians by management, scientists, and engineers.
2. Publicizing techniques for improving on-the-job utilization of technicians.
3. Expanding physical facilities of technical institutes.
4. Increasing the supply of adequately trained teachers in these institutes.
5. Increasing the number of students capable of pursuing the technical institute type of schooling.

The working group assigned the task of long-range improvements in science and mathematics programs in elementary and secondary schools made the following recommendations:

1. A reevaluation should be made of the scope, content, and quality of elementary and secondary school science and mathematics programs by the appropriate agencies in communities and States.
2. Organizations represented on the National Committee should take an active part, as appropriate, in stimulating and participating in such reevaluation at the local, state, and national levels in the ways suggested in the working group's report.

The National Committee determined that the most practical way of translating these recommendations into action was to establish a task force charged with the responsibility of designing a mechanism for bringing together in each State, teachers, school administrators, scientists, engineers, and representatives of industry and the public, to work toward the improvement of mathematics and science programs in elementary and secondary schools. The task force is also to concern itself with the quality and content of mathematics and science textbooks and other teaching materials.

The National Committee, at its second meeting, instructed the Chairman to organize additional working groups to develop programs looking toward the improvement of teachers and teaching in elementary and

secondary schools, and toward identification and guidance of students with aptitude for science and mathematics in the elementary and secondary schools.

The Committee also requested that study be made of the need for, and possible sources of, additional scholarships for high school graduates intending to enter into science and engineering courses in college.

MEMBERS OF THE NATIONAL COMMITTEE FOR THE DEVELOPMENT OF SCIENTISTS AND ENGINEERS

DR. HOWARD L. BEVIS, *Chairman*, President, Ohio State University.

DR. ERIC A. WALKER, *Vice Chairman*, President, Pennsylvania State University.

MR. ROBERT L. CLARK, *Executive Secretary*, National Science Foundation.

Engineering

MR. THOMAS H. CHILTON, President, Engineers Joint Council.

DR. MAYNARD M. BORING, President, American Society for Engineering Education.

Science

DR. DETLEV W. BRONK, President, National Academy of Sciences.

DR. PAUL B. SEARS, President, American Association for the Advancement of Science.

Management

MR. COLA G. PARKER, President, National Association of Manufacturers.

MR. A. BOYD CAMPBELL, President, U. S. Chamber of Commerce.

Labor

MR. GEORGE MEANY, President, American Federation of Labor-Congress of Industrial Organizations.

Education

DR. ARTHUR S. ADAMS, President, American Council on Education.

DR. IRVIN STEWART, President, American Association of Land Grant Colleges and State Universities.

DR. J. LESTER BUFORD, President, National Education Association.

DR. ROBERT STOLLBERG, President, National Science Teachers Association.

DR. LELAND N. DRAKE, President, National Association of Secondary School Principals.

DR. ARTHUR G. COONS, President, Association of American Colleges.

State and Local Governments

HON. ARTHUR B. LANGLIE, Governor of the State of Washington, Chairman of the Governors' Conference Council of State Governments.

HON. JOHN B. HYNES, Mayor of Boston, Mass., President of the United States Conference of Mayors.

DR. EDGAR FULLER, Executive Secretary, Council of Chief State School Officers.

Social Sciences and the Humanities

DR. FRED EGGAN, Chairman of the Board, Social Science Research Council.

DR. HOWARD M. JONES, Chairman, American Council of Learned Societies.

RECRUITING AND RETAINING SCIENTIFIC

PERSONNEL IN GOVERNMENT SERVICE

Of continuing concern to all Government agencies is the need to improve the status of scientific personnel in the Federal service. The Interdepartmental Committee on Scientific Research and Development (ICSRD), comprising representatives of major Government agencies engaged in scientific research, has been particularly concerned with difficulties in recruiting and retaining the qualified scientific personnel needed for the effective prosecution of Federal programs. Meetings have been held with officials of the Civil Service Commission from time to time to discuss the status of scientific personnel in Government and possible remedial programs, including proposals for legislative and administrative action.

The Federal Government finds itself in a weak competitive position in attempting to recruit and retain people with scientific training. Salaries and other benefits in industry have moved ahead more rapidly than they have in Government. Many agencies find it difficult to accomplish their research work successfully. In addition to the fact that salaries of scientists in Government employment are generally lower than those for comparable work in industry, the Committee has found that industrial practices with regard to recruitment, payment of expenses to place of employment, travel to scientific meetings, and support for further advanced education and training combine to make Government employment less attractive than industrial employment.

A number of legislative proposals have been advanced to improve this situation. In view of the present very rapid growth of research and development in the United States, much of it supported and directed by Federal agencies, the ICSRD feels strongly that the position of the Government as an employer of scientists must be improved in order that it may obtain and keep competent scientific personnel, both to conduct research and to supervise research handled by industry on contract. During the fiscal year reported upon, the ICSRD sent a resolution to the President recommending that he request early enactment of legislation by Congress to authorize competitive compensa-

tion and benefits for scientific and professional engineering positions in the Federal service. The ICSRD also sent a resolution to the Civil Service Commission recommending that the Commission ask for authority from Congress on an emergency basis to adjust salaries of scientists and engineers in categories found to be scarce.

These recommendations helped bring about material increases in salaries for scientists and engineers in the junior professional levels in time for effective recruitment among the June 1956 graduates. The summer employment of science teachers in the Federal Government was facilitated by a change in civil service regulations, which permitted greater utilization of scarce scientific skills.

INTERNATIONAL GEOPHYSICAL YEAR

Program Objectives

The International Geophysical Year (IGY) is a global program of coordinated measurements of the earth, its oceans, and its gaseous mantle, including observations of particles and radiation received from the sun and other extraterrestrial sources. The observational phase of the IGY will occur during the period July 1, 1957, through December 31, 1958.

National committees of some 50 nations are now involved in the planning and execution of suitable scientific programs and their integration into an effective whole. Additional nations are participating in this endeavor although without the formal creation of national committees. The measurements of various geophysical phenomena will be made on a coordinated time schedule with due regard to adequate geographical coverage.

The planning and technical direction of the United States program is in the hands of the United States National Committee for the International Geophysical Year (USNC-IGY) under the chairmanship of Dr. Joseph Kaplan. The committee exists under the aegis of the National Academy of Sciences-National Research Council. Members of the committee and its technical panels include many prominent scientists in geophysics and related fields in the United States.

The National Science Foundation, on the application of the National Academy of Sciences, sought and obtained appropriations from Congress for the United States program in the International Geophysical Year. The Foundation is also responsible for the administration of these funds and for coordination of Government interests in the undertaking. Federal appropriations made to the Foundation for support of the United States program are in turn made available by grant or transfer of funds to other Government agencies and private institutions engaged in the work on the basis of recommendations made by the USNC-IGY.

The United States plans observational programs in aurora and air-glow, cosmic rays, geomagnetism, glaciology, gravity measurements, ionospheric physics, longitude and latitude determinations, meteorology, oceanography, seismology, and solar activity. High altitude rockets and

earth satellites are essential techniques which will extend the coverage of geophysical measurements to the outer limits of the high atmosphere.

Program Activities

The early stages of preparation for the IGY were concerned primarily with the planning of operations, the establishment of technical program details, and the initiation of the procurement of those equipments and supplies which would be required to carry out the various program objectives. As the period of actual operations is approached, emphasis shifts to such operational factors as the testing of equipment, the recruitment and training of suitable personnel, and the establishment of special observing station sites and facilities including instrumental installations. By the end of June 1956, the program had definitely moved into the operational phase. Planning at this stage was primarily to accommodate minor adjustments in the program or to make modifications on the basis of available appropriations. Principal effort is now being devoted to the completion of instrument and material procurement, instrument testing, station construction, and personnel recruitment and training.

Technical planning of the program on a worldwide basis has been accomplished through a series of meetings of various international committees. The most important of these committees is the Comité Spécial de l'Année Géophysique Internationale of the International Council of Scientific Unions, commonly abbreviated CSAGI. Through CSAGI the various participating countries were invited to establish their own special national committees for the IGY and to submit appropriate programs which were synthesized and coordinated under the auspices of the CSAGI to form the final IGY program. To accomplish this, CSAGI has held a number of meetings which have included, in addition to its own members, suitable representative delegations of scientists from the various participating countries.

During fiscal year 1956, a further meeting of the CSAGI was held as well as several meetings of various groups of nations for the discussion of programs and problems in the Arctic, Antarctic, and Western Hemisphere regions. As a consequence, the modified and enlarged United States program was endorsed and suitable cooperative negotiations have been and are being conducted for the work in various regions. Changes in the United States program consist of the addition of gravity measurement and seismological studies and of increased emphasis on all fields of geophysics, particularly oceanography. Additional stations are to be established in the Arctic and Antarctic regions. The earth satellite

program, discussed later, is now a principal part of the United States program.

World Data Centers

One of the fundamental precepts of the IGY is the availability of IGY data to all scientists and countries. Plans for the establishment of world data centers to be located in strategic geographical areas were agreed to at the Brussels meeting of CSAGI in the fall of 1955. Detailed planning for such centers is now in progress. A special group has been appointed by the United States National Committee for the IGY to plan the establishment of a world data center for the Western Hemisphere.

Progress in the Antarctic

Procurement of all scientific equipment for the United States IGY Antarctic program has been initiated and in many cases completed. The Navy expedition "Deepfreeze I" left the United States in November 1955, and returned in the spring of 1956. This expedition carried scientific and logistic equipment and materiel for the establishment of the air operations facility at McMurdo Sound and for the three scientific stations at Little America, Marie Byrd Land, and the South Pole. The air operations facility and the Little America station have been completely established and logistics parties are wintering over at both bases. Ground explorations for the establishment of the Marie Byrd station and air reconnaissance for the establishment of the South Pole station were conducted. For the first time in history heavy aircraft were flown all the way to the Antarctic continent, and photomapping of a considerable portion of the continent was carried out.

In the coming year, the Navy expedition "Deepfreeze II" will transport all scientific and logistic equipment and materiel for the establishment of the Weddell Sea, Knox Coast, and Cape Adare stations and will transport the full United States scientific party for the first year's operations. Dr. Laurence M. Gould, a member of the National Science Board, is director of the US-IGY Antarctic program and Dr. Harry Wexler is chief scientist for the Antarctic program.

Progress in the Arctic

In the augmented United States program, additional stations have been planned in the Arctic for work in aurora and airglow, geomagnetism, glaciology, ionospheric physics, meteorology, oceanography, and

rocketry, as well as for appropriate segments of the new programs of seismology and gravity.

A rocket-launching facility has been virtually completed at Fort Churchill, Canada, under a bilateral agreement with Canada. Numerous rockets from this site will probe the upper atmosphere during the IGY and will extend measurements in many of the IGY disciplines. The largest of these rockets is the type called Aerobee-Hi, specifically designed for research purposes.

Plans are now being made for long-term occupancy of two ice-floe stations by scientific parties. These stations will reduce the gaps in Arctic positions for measurement of aurora and airglow, ionospheric physics, and meteorology, and will yield valuable information concerning Arctic oceanography.

Progress in the Continental and Equatorial Regions

The IGY effort within the United States and its Possessions will make use of existing weather, magnetic, and ionospheric stations by augmenting in some cases the observations normally conducted at such sites. Many additional temporary stations will be activated to reduce geographical gaps, to create finer networks, and to complete chains of stations whose locations will be significant for the observations to be made. This "chain" concept is particularly significant in the case of all of the planned pole-to-pole chains. The United States is especially concerned with the series of stations along the 75°–80° west longitude meridian line which falls within the Western Hemisphere. In this case the United States and certain of the Latin American countries will cooperate in order to assure the success of the observations along this line.

In the equatorial regions similar observations will be made at locations critical in the world coverage in areas of natural interest to the United States, such as islands in the Trust Territory and islands close to the geographic and geomagnetic equators. Rocket firings will be conducted at Guam in order to strengthen the coverage of upper atmosphere observations. Extended oceanographic observations in the Atlantic and Pacific will be made.

The Earth Satellite

On July 29, 1955, the CSAGI electrified the world with the announcement from Brussels that the United States would launch earth-circling satellites for scientific purposes during the period of the IGY. This was immediately followed by announcement from the White House.

This decision was the culmination of studies which had been stimulated by a resolution passed at Rome in 1954 by the CSAGI, inviting any nation that had the capability to launch such a satellite during the interval July 1, 1957, through December 31, 1958.

To the scientist the satellite is a natural extension of high-altitude rocket techniques which have been applied so effectively to the measurement of various physical properties and quantities in the upper atmosphere. The scientific experiments planned in the earth satellite program will include temperature and pressure measurements; micrometeorite and cosmic dust density measurements; primary cosmic ray measurements; solar ultraviolet measurements; and possibly geomagnetic measurements. These measurements will be transmitted to the ground by telemetering equipment for later use by scientists. In addition, by exact calculations of the satellite's orbit based primarily on optical observations, a determination can be made of air density and gross variations in the form and structure of the earth. Ultimately, as the satellite is slowed down by the slight atmospheric drag, it will spiral in closer to the earth and be burned up in the lower denser atmosphere and thus will not return to earth.

The responsibility for the development and launching of a successful satellite for scientific purposes was assigned to the Department of Defense, with the Navy as the manager of the technical program. The Naval Research Laboratory was assigned the actual task of carrying out the project, which was given the code name of VANGUARD.

By the end of June 1956, decisions had been made on all important characteristics of the satellite and the launching vehicle required to put it on orbit. The launching site was selected and the orbit characteristics agreed to.

Appropriations

The increased United States programs for the IGY, including the earth satellite, have necessitated additional funding. On the basis of revised needs, the Congress appropriated \$27 million to the Foundation in 1956 to cover these items. This, added to the \$12 million already made available, gives a total appropriation for the special IGY operations of \$39 million. This does not include the cost of logistics support for Arctic, Equatorial, and Antarctic operations or the contributions in services, materiel, and facilities made by the Department of Defense to the earth satellite program. Grants totaling \$14,789,817 were awarded during fiscal year 1956.

Conclusion

The IGY, a worldwide effort of tremendous complexity, is proceeding on a satisfactory schedule because of the effective cooperation of the fifty-odd countries now actively participating in the program. Indeed, this operation may well serve as a pattern for future international scientific efforts, particularly in various fields of geophysics where the need is indicated for continued or more detailed studies beyond the period of the IGY.

FEDERAL POLICY ON CONDUCT

AND SUPPORT OF RESEARCH AND

DEVELOPMENT IN SYNTHETIC RUBBER

Under the terms of the report of the Rubber Producing Facilities Disposal Commission of January 1955, which received congressional sanction in April 1955, the National Science Foundation was charged with: (1) assuming responsibility for the Government's program of synthetic rubber research previously carried on by the Federal Facilities Corporation, including the operation of the Government laboratories at Akron, Ohio; and (2) evaluating the future role of the Federal Government with respect to research in this field.

Through the 1956 fiscal year, the Foundation continued rubber-research contracts with universities which had been originally placed by the Federal Facilities Corporation. Likewise, the Foundation supported operation, at a reduced scale, of the Government laboratories at Akron. With a view toward full utilization of laboratory facilities during the period of evaluation, the Foundation authorized the University of Akron to undertake privately sponsored research under contracts with various firms. This not only afforded a partial basis for evaluating the degree of industrial interest in the laboratories, but also, through income from private contracts, reduced the Government's outlay toward laboratory operation during the year by about \$250,000.

In meeting the second responsibility with which the Foundation was charged—namely, the evaluation of the future role of the Government with respect to research in synthetic rubber—the Foundation appointed a special commission made up of scientific, university, industrial, and other representation. (Appendix A, p. 102). The Commission was asked to recommend what future Federal support, if any, should be given to research in the field of synthetic rubber and also to recommend a course to be followed with regard to the Government laboratories at Akron.

The following constituted, in essence, the findings and recommendations of the Foundation's Special Commission for Rubber Research:

1. Funds for the governmental support of basic research should not be requested from the Congress for specific industries or commodities in the absence of overriding considerations of defense or other special national interests, and the Commission found no such compelling considerations with respect to the synthetic rubber industry.

2. Research on problems directed toward specified end products involving rubber and needed by the military agencies, whether called basic research or applied research, is most appropriately carried on through contracts placed by the Department of Defense with individuals or groups chosen by it.

3. Government-sponsored research is no longer necessary to develop a natural rubber substitute since three or more companies have recently succeeded independently in synthesizing material with composition and properties similar to natural rubber, using isoprene as a raw material. However, the executive branch of the Government should give careful consideration to the actions needed to insure an adequate production base for the new synthetic natural rubber in the event of an emergency.

4. The program of Government-sponsored rubber research projects, formerly conducted by the Federal Facilities Corporation and assumed from the Corporation by the Foundation, should be terminated; in place of this program the Foundation should support basic research in the general area of high polymers (of which rubber is only an example).

5. Transfer of the Government laboratories to non-Government hands would not handicap the activities and programs of Federal agencies.

6. Moderate interest exists in rubber and related industries in acquiring the laboratories.

7. The Government laboratories should be offered for sale after June 30, 1956, unless the University of Akron (the then existing contractor) accepted a lease for operating the facility under its own responsibility for an additional year.

The report of the Special Commission was approved by the National Science Board at its 37th meeting dated December 5, 1955. Subsequently, the report was endorsed by the Office of Defense Mobilization and was incorporated into the President's message to the Congress on rubber resources, requirements, and research, dated April 30, 1956.

In implementing the recommendations of the Commission, the National Science Foundation, other agencies, and the Congress took the following actions:

1. The rubber research program which had been taken over a year earlier from the Federal Facilities Corporation was terminated as of June 30, 1956.

2. In February 1956, an Advisory Panel for High Polymer Research was appointed and out of its reviews and recommendations a variety of research grants were approved for Foundation support during fiscal year 1957. During the fiscal year 1958, it is planned to continue the support of high polymer basic research as an integral part of the chemistry program of the Foundation.

3. The operations of the Government laboratories at Akron were gradually phased out and brought to complete termination on June 30, 1956.

4. The Foundation offered to the University of Akron a 1-year lease of the laboratories under terms recommended by the Commission. The university rejected this offer and, consequently, the Foundation recommended legislation to the Congress authorizing the disposal of the laboratories. In the closing days of the 2d session of the 84th Congress, legislation was passed and signed by the President transferring jurisdiction over the laboratories to the General Services Administration and authorizing the Administrator of General Services to sell the laboratories, after taking into account the possible value of the laboratories to other agencies of the Federal Government.

5. The Office of Defense Mobilization and the Department of Defense have been giving continuing attention to the production base of the new synthetic natural rubber. The Department of Defense has placed orders for limited quantities of tires made from the new rubber. In his message to the Congress dated April 30, 1956, President Eisenhower said in part: "The Government has available a number of means for assisting industrial development and expansion where such aid is found to be essential to national security. It is not now expected that any unique measures, such as would require new legislation, will need to be taken with reference to the development of capacity to produce synthetic natural rubber."

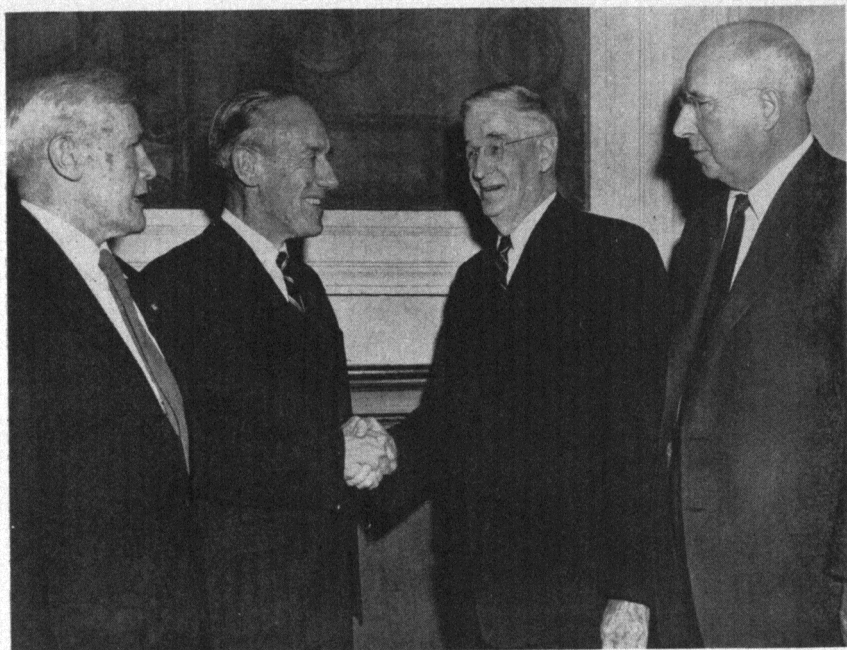
A

Photographic

Sampling of

Foundation

Activities



A GREAT SCIENTIST RETIRES

Dr. Vannevar Bush was the honored guest at the annual reception of the National Science Board on December 5, 1955. Dr. Bush retired at the end of last year from the presidency of the Carnegie Institution of Washington and from formal participation in the administration of scientific affairs. More than 100 friends of Dr. Bush, representing the executive, judicial, and legislative branches of the Government, as well as his colleagues and associates in the scientific and educational community, came to wish him well. Here, Dr. Bush (second from right), often recognized as the "father" of the National Science Foundation, shakes hands with Dr. Detlev W. Bronk, newly elected Chairman of the National Science Board, in company with Dr. Waterman, Director of the Foundation (left), and Dr. Chester I. Barnard, retiring Chairman of the Board.



BRINGING THE STARS DOWN TO EARTH

Widely extending man's knowledge of the universe, this 60-foot radio telescope at Harvard University's Agassiz Station Observatory was dedicated on April 28, 1956. The Foundation is supporting construction of a 140-foot radio astronomy telescope at Green Bank, W. Va. The new Green Bank facility will be available for use by astronomers throughout the Nation. (p. 56.)



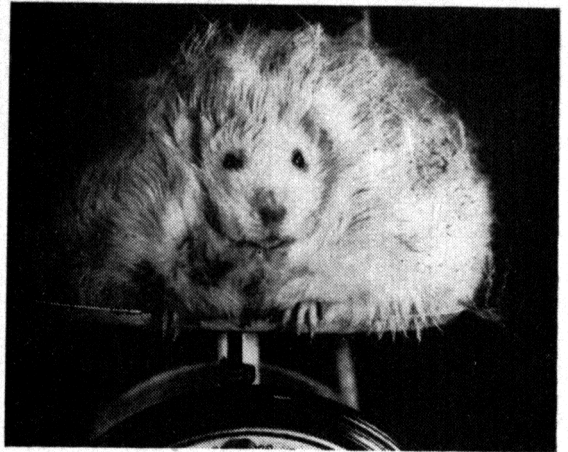
COMPUTERS HELP SPEED SCIENTIFIC RESEARCH

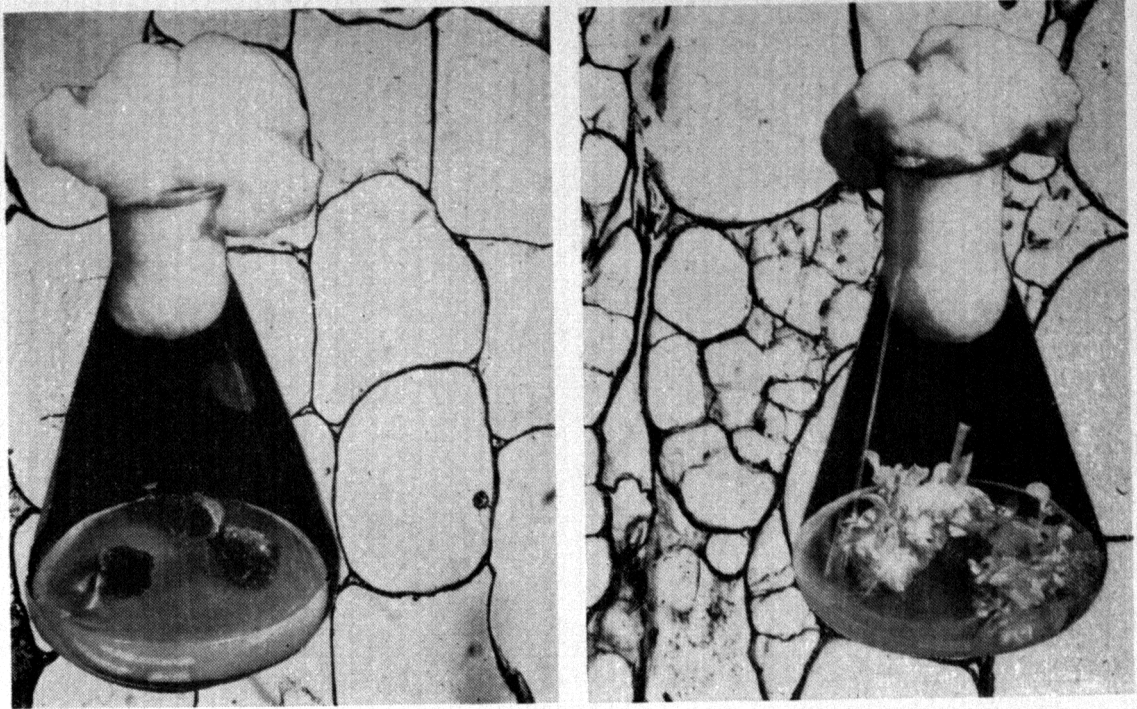
Illiac is the heart of the Digital Computing Laboratory at the University of Illinois. Voltages are being checked in the arithmetic unit at the left, while at the right a punched output tape which communicates with the machine is being examined. Scientists have been using the Illiac to compute solutions to hydrodynamical field equations in relativity theory—an example of the contribution of high speed digital computers to science progress. The Foundation recently announced grants totaling \$135,000 to support university computing centers at the California Institute of Technology, the Massachusetts Institute of Technology, Oregon State College, and the Universities of Washington and Wisconsin. (p. 57.)



HYPOTHALAMIC CONTROL OF APPETITE

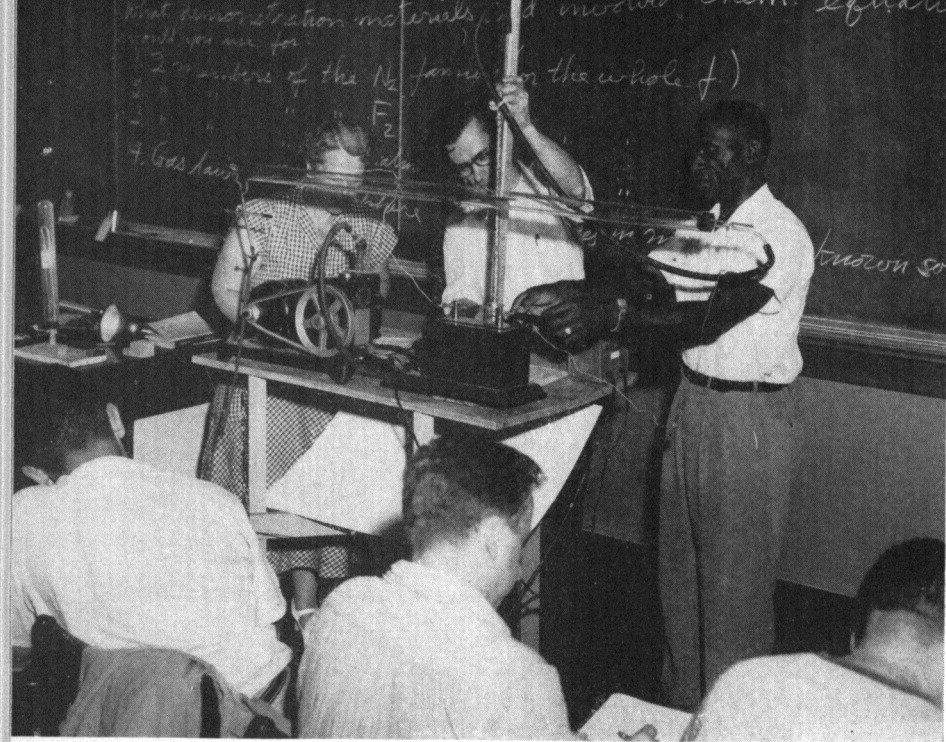
The two rats are litter-mate brothers. However, one weighs about twice as much as the other because a specific tiny area in the hypothalamus (a portion of the brain) has been experimentally damaged. Destruction of this appetite center results in virtually uncontrollable appetite. Animals whose appetite center is damaged appear not to be able to stop eating as long as food is accessible and, in consequence, become very obese. This and related research, supported by the National Science Foundation, promises to provide a more complete understanding of the complex factors which control eating behavior and motivation.





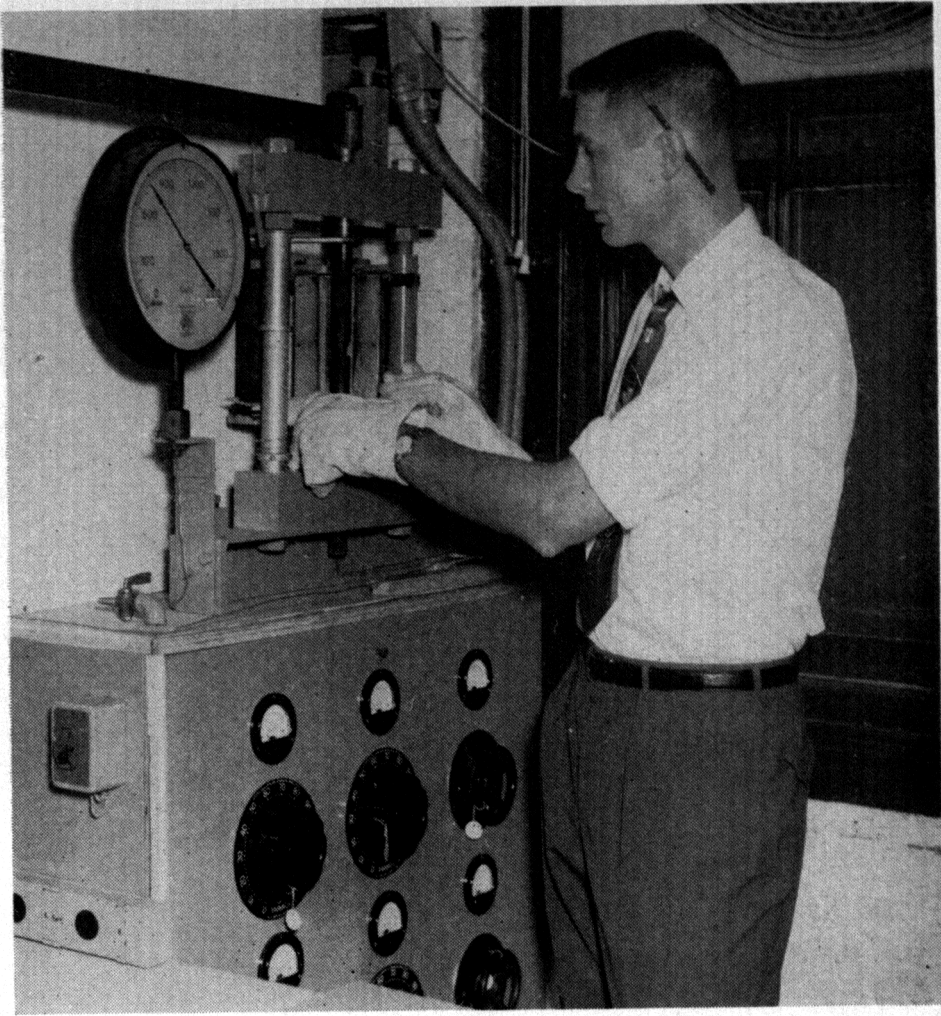
KINETIN STIMULATES CELL DIVISION

The newly discovered substance, kinetin, causes marked increase in cell division. The piece of plant tissue in the left flask is growing in an artificial fluid medium. That in the right flask is growing in the same solution with a tiny amount of kinetin added. The large increase in size and the budding in the latter are evident. The flasks have been superimposed on microscopic views of the plant tissues to show the marked rise in number of cells in the tissue exposed to kinetin. (p. 47.)



IMPROVING HIGH SCHOOL SCIENCE TEACHING

Groups similar to this one in the physics laboratory of Pennsylvania State University studied and worked in classrooms and laboratories of 25 summer institutes for high-school and college science teachers supported by the National Science Foundation. Here the teachers experiment with the electrical discharge of gases at low pressures. During the 1956 summer period, 1,300 teachers improved their skills in science instruction in institutes widely scattered across the Nation. In 1957, the Foundation expects to support some 95 summer institutes to serve about 4,500 high-school science teachers and 250 college science teachers. (p. 67.)



ONE OF 895 FELLOWS OF THE NATIONAL SCIENCE FOUNDATION

Wallace G. Ernst, of Minnesota, a graduate of Carleton College, opens an electric furnace to remove a small piece of mineral from equipment which simulates actual pressures and temperatures under which minerals are formed several miles under the earth's surface. In his terminal year studies for his doctorate at Johns Hopkins University, Ernst is working in the Geological Laboratory of the Carnegie Institution of Washington. He was one of 895 men and women who were awarded fellowships by the Foundation during 1955-56 and who were continuing advanced study in science in colleges and universities in the United States and other nations. (p. 72.)



BOOKS FOR FUTURE SCIENTISTS

In cooperation with the American Association for the Advancement of Science, the National Science Foundation supports traveling science libraries for students in outlying communities of the Nation where library facilities are relatively inaccessible. Boxes containing a total of 150 books, carefully selected by competent scientists in the several fields of science, are rotated each month among participating schools. (p. 69.)

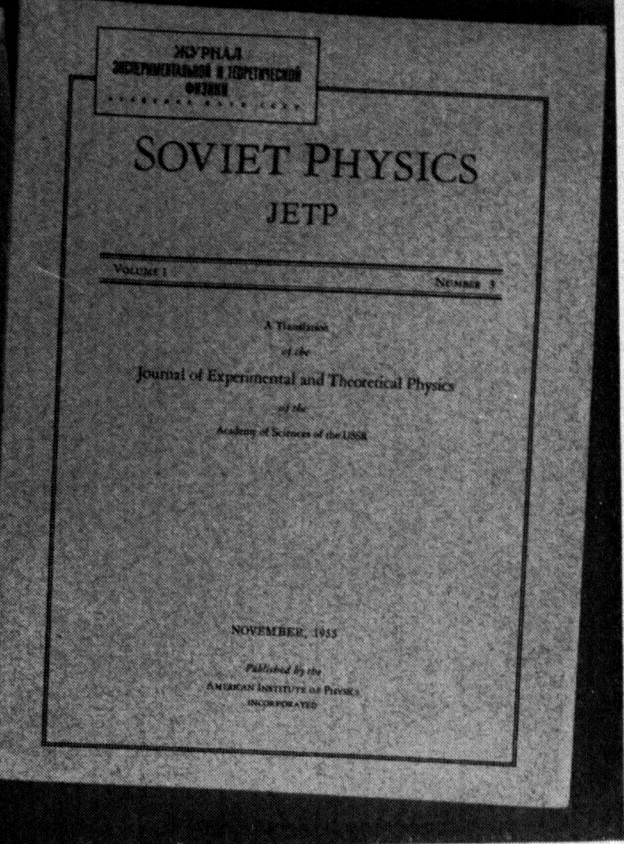
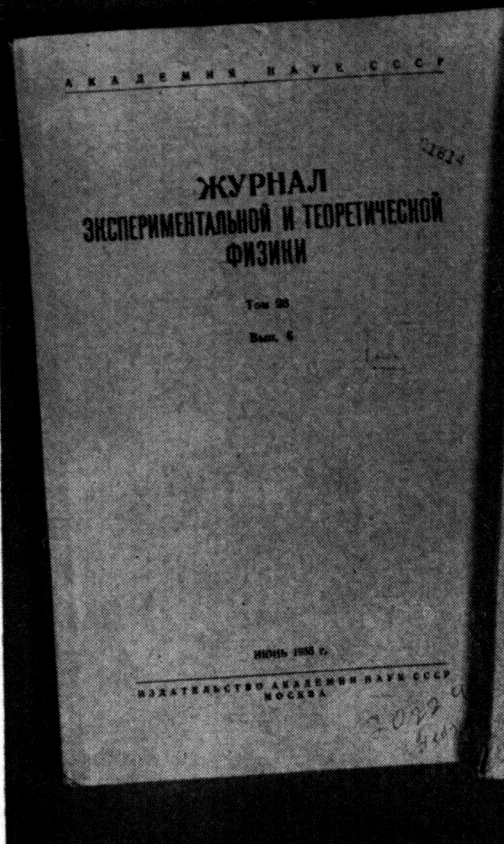


Рис. 2. Единичная сфера с областью $0 \leq \alpha \leq \alpha_0$, $-\beta_0 \leq \beta \leq \beta_0$ (область $ABCD$), в которой рассеивается половина всех рассматриваемых вторичных частиц. Рисунок симметричен относительно плоскости xz . Направление падающих частиц совпадает с осью z . Ядерная реакция происходит в точке O

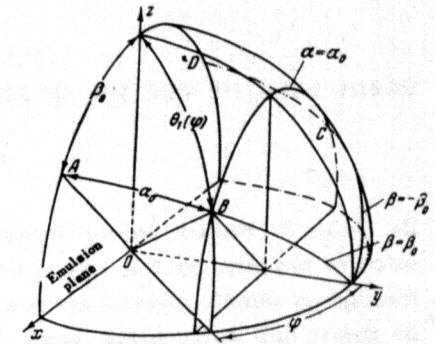
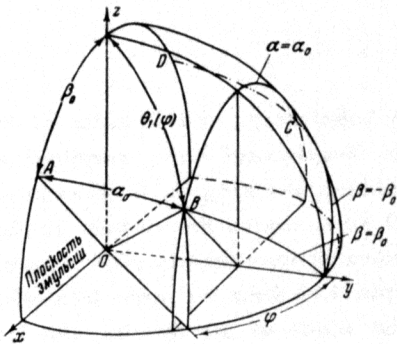
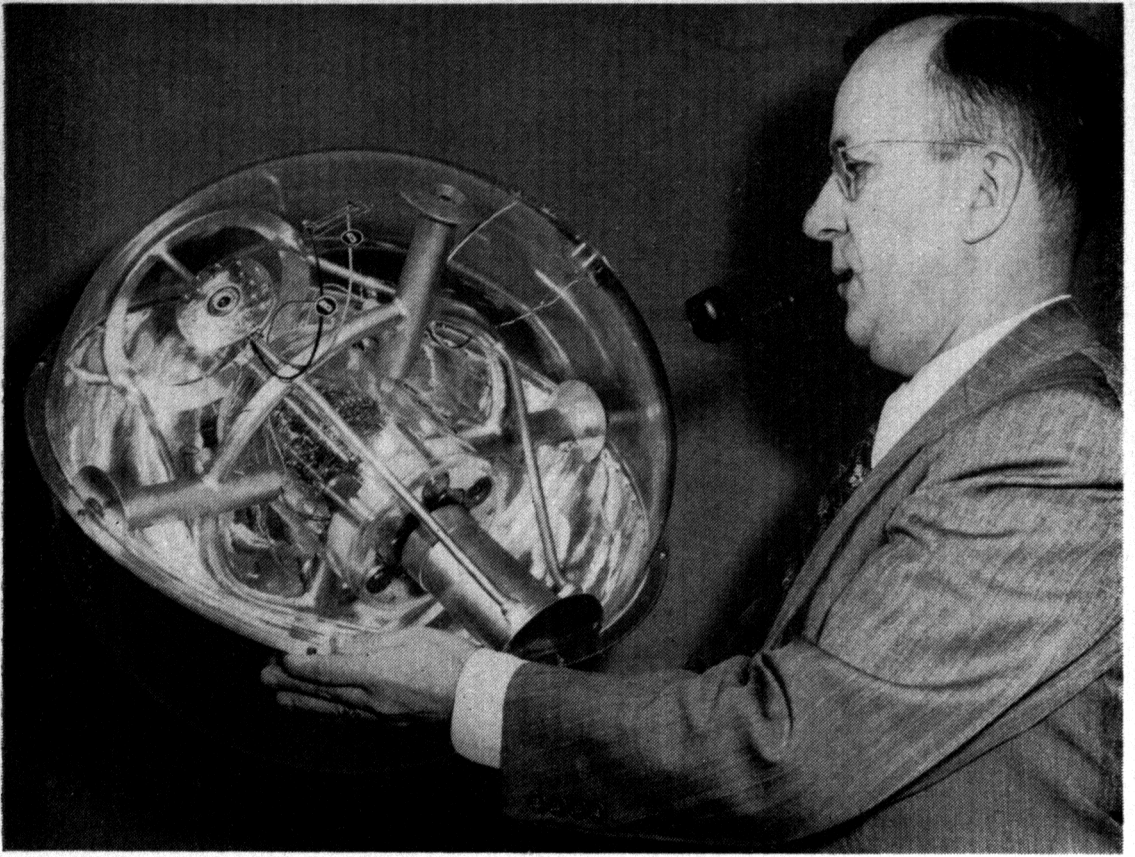


FIG. 2. The unit sphere with the region $0 \leq \alpha \leq \alpha_0$ and $-\beta_0 \leq \beta \leq \beta_0$ (surface $ABCD$) within which is scattered half of all the secondary particles under consideration. The figure is symmetric about plane xz (the emulsion plane). The direction of the incident particle is along the z axis. O is the point of the nuclear interaction.

OTHER-NATION RESEARCH MADE AVAILABLE TO UNITED STATES SCIENTISTS

The Russian Journal of Experimental and Theoretical Physics was one of several Russian scientific journals translated into English under programs supported by the National Science Foundation during fiscal year 1956 to make more accessible to United States scientists the research performed by scientists of other nations of the world. Soviet Physics-JETP is published and sold through subscription by the American Institute of Physics. It received wide acceptance among physicists, and by the close of the fiscal year, its subscription list had grown to 700. (p. 80.)



EARTH SATELLITE FOR THE INTERNATIONAL GEOGRAPHICAL YEAR

Dr. John P. Hagen, Naval Research Laboratory, and Director of Project Vanguard, earth satellite program of the International Geophysical Year, examines a model of the satellite through a plastic-covered cutaway section showing its instrumentation. The satellite will be thrust into outer space, some 300 miles above the surface of the earth, by a powerful, three-stage rocket. There it will revolve in its elliptical orbit, circling the earth once every hour and a half while recording geophysical data for radio transmission to receivers on the earth's surface. Observations will be made of air density, the ionosphere, geodetic and meteoritic phenomena, temperature and pressure, ultraviolet radiation from the sun, and cosmic ray intensities. The National Science Foundation is coordinating certain aspects of Federal Government participation in the International Geophysical Year and is also responsible for administering Federal Funds for the IGY in accordance with the program plans of the United States National Committee. (p. 22.)

Program Activities

of the National

Science Foundation

THE RESEARCH REPORT

Each year since its establishment in 1950, the Foundation has dedicated the largest portion of its appropriated funds to support efforts of scientists in the colleges and universities of the Nation to assure what, in *Science—The Endless Frontier*, Dr. Vannevar Bush called a “flow of new scientific knowledge.” During fiscal year 1956, for example, out of a total appropriation of \$16 million, Foundation support of basic scientific research was \$9.6 million. These funds made possible 734 grants in the biological, medical, mathematical, physical, and engineering sciences to 258 institutions in 47 States, the District of Columbia, Hawaii, Puerto Rico, Canada, England, France, and Italy. Research grants for fiscal year 1956 averaged \$13,800 to run for 2.1 years, or about \$6,600 per year.

The table below summarizes the research support program by broad subject categories. A detailed list of the grants showing institution, principal scientist, title of project, and amount is given in appendix B, p. 112.

National Science Foundation Research Grants by Fields of Science

Field	Fiscal years 1952–55		Fiscal year 1956		Total	
	Number	Amount	Number	Amount	Number	Amount
Biological and medical sciences:						
Anthropological	5	\$51,700	13	\$133,100	18	\$184,800
Developmental	49	392,695	23	211,500	72	604,195
Environmental	38	287,960	47	473,300	85	761,260
Genetic	46	612,700	30	395,800	76	1,008,500
Molecular	103	1,551,150	80	1,218,580	183	2,769,730
Psychobiology	80	1,001,950	61	717,700	141	1,719,650
Regulatory	144	1,894,295	72	1,028,850	216	2,923,145
Systematic	105	819,280	79	603,200	184	1,422,480
General	29	473,910	21	342,700	50	811,610
	599	7,085,640	426	5,124,330	1,025	12,209,970

National Science Foundation Research Grants by Fields of Science—Continued

Field	Fiscal years 1952-55		Fiscal year 1956		Total	
	Number	Amount	Number	Amount	Number	Amount
Mathematical, physical, and engineering sciences:						
Astronomy	45	\$420, 700	27	\$225, 700	72	\$646, 400
Chemistry	167	1, 889, 700	85	1, 186, 900	252	3, 076, 600
Earth Sciences	66	820, 450	39	512, 525	105	1, 332, 975
Engineering	127	1, 302, 300	55	726, 200	182	2, 028, 500
Mathematics	88	835, 550	39	712, 350	127	1, 547, 900
Physics	139	1, 941, 600	58	1, 105, 800	197	3, 047, 400
Sociophysical	4	50, 700	4	54, 400	8	105, 100
General	0	0	1	7, 000	1	7, 000
	636	7, 261, 000	308	4, 530, 875	944	11, 791, 875
Total research grants	1, 235	14, 346, 640	734	9, 655, 205	1, 969	24, 001, 845

The geographical distribution of Foundation grants and research funds for the 5-year period, 1952-56, is shown in figure 7 and the accompanying table.

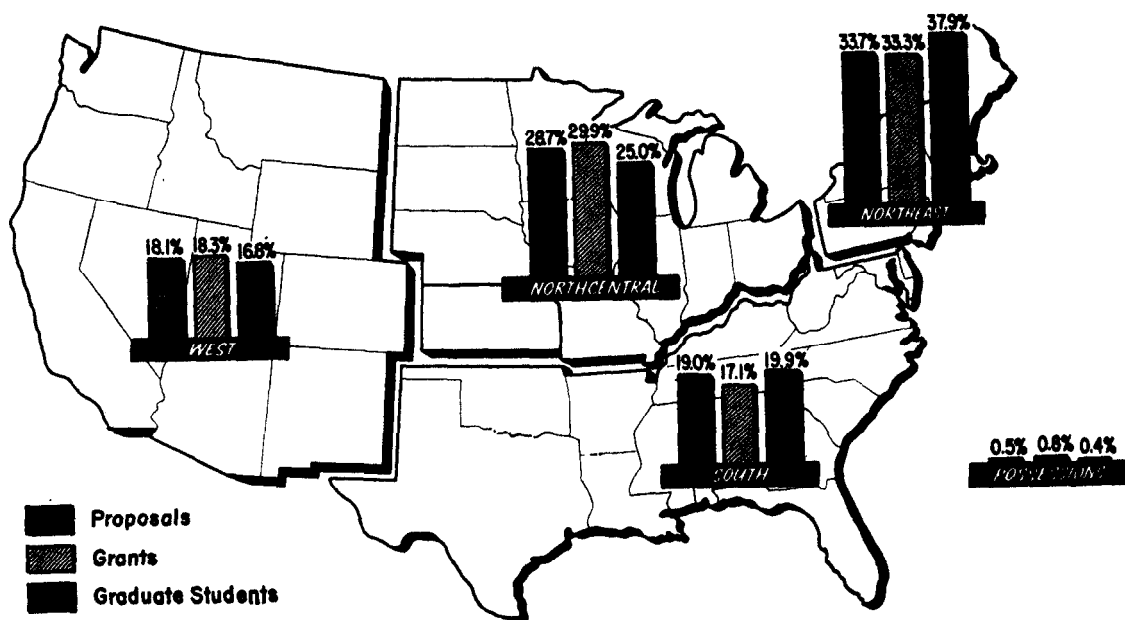
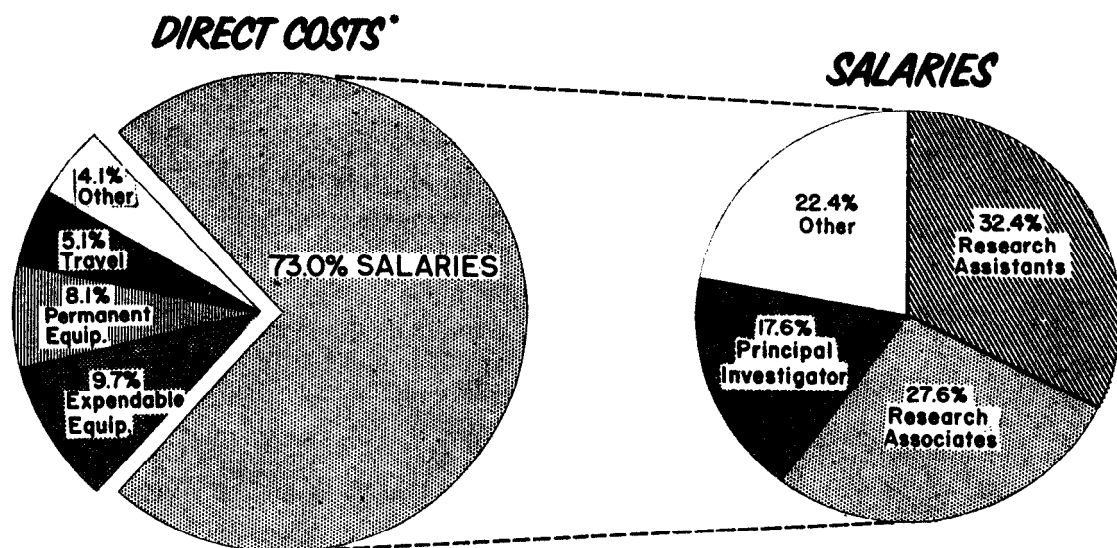


Figure 7.—Regional comparison of proposals received (dollars), grants awarded (dollars), and graduate student population, fiscal years 1952-56.

Regional Distribution of Proposals Received, Grants Awarded, Graduate Students, and Total Population

Region	Fiscal years 1952-56				Academic year 1953-54 graduate students		1950 census total population (100,000's)	
	Proposals received		Grants awarded		Number	Per-cent	Number	Per-cent
Northeast	\$34,840,296	33.7	\$8,108,075	33.9	92,000	37.9	395	26.2
South	19,701,775	19.0	4,102,560	17.1	48,312	19.9	443	29.3
North Central . .	29,681,310	28.7	7,158,860	29.9	60,511	25.0	471	31.2
West	18,686,215	18.1	4,368,150	18.3	40,767	16.8	197	13.0
Possessions	514,064	.5	183,900	.8	936	.4	5	.3
Totals	103,423,660	100.0	23,921,545	100.0	242,526	100.0	1,511	100.0

From figure 8 and the following table, it can be seen that 73 percent of the total funds distributed have gone for salaries and 18 percent for equipment. Indirect costs amounted to 13 percent of direct costs.



*Indirect Costs = Approximately 13% of Total Direct Costs

Figure 8.—Analysis of the average National Science Foundation research grant by type of expenditure (estimated).

Analysis of Salaries Paid From Average Research Grant ¹

	<i>Average grant fis- cal year 1956</i>	<i>Percent of salaries</i>
Principal investigator (total).....	\$1,566	17.6
Summer.....	(1,057)	(11.9)
Sabbatical.....	(23)	(.3)
Academic.....	(486)	(5.4)
Research associate ²	2,450	27.6
Research assistant ³	2,877	32.4
Other ⁴	1,984	22.4
	<hr/>	<hr/>
Total.....	8,877	100.0

¹ Based on budget estimates at the time of Board approval.

² Includes post-Ph. D. scientific personnel normally spending full time on research and usually not occupying tenure positions at the institution where they are doing the research.

³ Includes graduate assistants enrolled at the grantee institution and working toward a master's degree or a doctorate.

⁴ Includes laboratory technicians and assistants, undergraduate assistance, miscellaneous direct labor charges and retirement charges where the grantee's accounting system treats these as a direct charge.

Toward Clearer Understanding

Understanding is incompletely served, however, by listing amounts of money expended to support basic research in molecular biology, regulatory biology, psychobiology, earth sciences, engineering sciences, or mathematical sciences, unless these terms convey meaning to the reader. What, for example, is regulatory biology? Regulatory biology may be considered to be the scientific area concerned with biochemical and physiological mechanisms which regulate and control such vital processes as development, growth, functional activity, reproduction, and degeneration of living matter. The work of Dr. F. M. Strong and his colleagues at the University of Wisconsin, on factors which stimulate and inhibit cell division, represents the kind of basic research supported by the Foundation in regulatory biology.

Isolation of "Kinetin"

Investigation of the processes of nutrition and metabolism in living organisms have led to the discovery and isolation of a new compound called kinetin which has the property of stimulating cell division. When a trace of kinetin (as little as one part in a million parts of other matter) is added to culture media for plant tissue cells which are long past the growth period, the cells divide and new cells continue to be formed indefinitely so long as kinetin

is in the medium. When such rapidly growing tissue is placed in the same medium without kinetin, it stops growing (see photo section). Continuous growth can be achieved by appropriate additions of kinetin and another substance, called auxin. Substances having effects similar to that of kinetin now have been obtained from a number of plant and animal sources. This latter finding suggests that kinetin may actually be a component of the nucleic acids.

Recently, as a direct outgrowth of this work by Dr. Strong and his associates, another investigator has prepared an analog of kinetin which prevents, rather than stimulates, the division of animal cells.

A second interesting development which has resulted from this work was reported several months ago by Dr. Werner Braun of Rutgers University. Dr. Braun, with Foundation support, is investigating the effect of certain metabolic substances on the growth and multiplication of specific cell types in bacteria. He has found that a very small amount of kinetin added to cultures of the organisms which cause lobar pneumonia and undulant fever have the effect of changing nonvirulent strains to virulent ones. Furthermore, this effect could be reversed by the addition of a derivative of nucleic acid, which is a vital constituent of all living cells.

Similarly, we may analyze the meaning of the term, earth sciences. Scientists who study the core of the earth, its crusts, its oceans, its winds, its weather, and on beyond to its upper atmosphere including the ionosphere—these are earth scientists. Among them are meteorologists, oceanographers, seismologists, astronomers, engineers, physicists, and others. For a better understanding of the significance of the work of earth scientists, the gravity and seismic studies of the Colorado Plateau being made by Dr. George P. Woollard, of the University of Wisconsin, are described below. They are typical of Foundation-sponsored research in the earth sciences.

Gravity and Seismic Studies in Colorado

As remote as are the stars and interstellar space, they are still more accessible to instruments than the interior of the earth. Below a depth of about 4 miles, rocks are beyond the range of sampling or visual observation, and ideas about the composition of the earth are based largely on inferences drawn from earthquake waves, gravity studies, magnetic studies, a few laboratory experiments, and general theories.

One of the principal theories of crystal structure is isostasy, which says that above a certain zone of compensation all columns of rock with equal area are equal in mass: mountains stand higher because they are lighter. The interpretation of seismic waves suggests also that the principal mountain ranges have roots of lighter material that extend downward several kilometers into the denser parts of the crust, just as an iceberg extends below the surface of the ocean. Recent seismic studies of the Colorado Plateau area, however, indicate that this large elevated region may not have roots; if so, it is unique. Dr. Woollard's studies of the plateau are designed to determine whether earlier work has been interpreted correctly.

In addition to the fact that the basic research pursued by Dr. Strong and Dr. Woollard extends man's knowledge of the laws of nature, it may turn out to be valuable, with reference, in the first instance, to the chemotherapy of cancer, and in the second instance, to firmer concepts of earth structure. When published, results of such research become part of the Nation's fund of scientific knowledge, freely accessible to scientists everywhere. They are particularly valuable to scientists who work in areas of applied and developmental research.

Research-Support Programs

Immediately responsible for Foundation programs in support of basic research are the Division of Biological and Medical Sciences and the Division of Mathematical, Physical, and Engineering Sciences. A detailed list of the grants, recommended for support by these divisions and approved by the National Science Board for fiscal year 1956 is given in appendix B, and shows institutions, principal scientists, title of project, duration, and amount.

Research Supported by the Division of Biological and Medical Sciences

In the *regulatory biology program* almost all phases of physiology and of the more physiological aspects of biochemistry were represented. The larger segments were in mammalian intermediary metabolism, endocrinology, microbial metabolism, and immunology, as well as invertebrate, plant, and cellular physiology. In the *molecular biology program* the greatest number of grants were in the field of protein and enzyme structure. Next in order were those dealing with the chemical reactivities and kinetics of proteins and enzymes. The program also

supported a significant number of studies dealing with the metabolism and biosynthesis of amino acids, carbohydrates, phosphates, and sulfur-containing biological compounds.

In the *genetic and developmental biology program*, the Foundation supported research on transduction, i. e., the transfer of genetic information from one bacterium to another as by viral or other means. Various quantitative studies of the properties of animal viruses were supported as were pioneering studies on the genetics of microscopic algae. Support was provided for work in highly active fields, such as population genetics, as well as for relatively unexplored areas such as the endocrinology of the armadillo—seeking an understanding for the invariable production of quadruplets. In the *psychobiology program*, inquiries into the neurophysiology of learning have been given continued support as has been research on problems of brain biochemistry and behavior. A program of support has been continued for psychology departments in the small colleges aimed at strengthening both their research and training efforts.

Among the grants in the *systematic biology program*, somewhat less than half were in the field of regional studies of a group of plants or animals with other support being given to general taxonomy, and the preparation of indices. The *environmental biology program* included grants in various areas of environmental biology—paleoecology, phytosociology, structure and productivity of marine and fresh-water ecosystems, physiological ecology, microclimatology, ecological life histories of plants and animals, and radiation ecology.

Within the *anthropological and related sciences program* areas, grants activated during the fiscal year were in anthropology, archaeology, demography, psycholinguistics, and social psychology.

Research Supported by the Division of Mathematical, Physical, and Engineering Sciences

In the *astronomy program* were grants in support of projects ranging from the study of Mars at its close approach to the Earth in 1956, the systematic observation of asteroids, studies on the composition and motion of stars, to the investigation of radio radiation with a wavelength of 21 centimeters characteristic of neutral atomic interstellar hydrogen in the great cluster of galaxies in Coma Berenices. Moreover, a good start has been made in strengthening astronomical instrumentation, both optical and radio.

The *chemistry program* provided chief support to research in organic and physical chemistry and also supported research in analytical and

inorganic chemistry. Research was supported in organic chemistry on mechanisms of reactions, structure and synthesis of natural products, chemistry of free radicals, and studies on small and large ring compounds; in physical chemistry, on theoretical studies of atomic and molecular structure, photochemistry, spectroscopy, thermodynamics, thermochemistry, fast chemical reactions, and studies at high temperatures with solar furnaces; in analytical chemistry, on gas chromatography, polarography, and the nature of precipitates; in inorganic chemistry, on stereochemistry, X-ray and crystallographic studies, isotope exchange reactions, and chelates. Plans have been made for the support of research programs concerned with high polymers, for increased support of research at low temperatures, and for awarding grants for research instrumentation in chemistry.

In the diverse field of the *earth sciences program*, geochemistry warranted a major portion of the research budget, largely because new instrumentation and techniques developed during the past 15 years have opened up many promising lines of work, especially the study of isotopes in their geologic setting. Support of oceanographic research has recently resulted in significant progress. Through grants for the analysis of deep ocean cores from the bottom of the Atlantic, valuable information on sedimentation has been revealed, such as that pertaining to grain size and isotopic composition. Support was also made available for research in geophysics, stratigraphy, paleontology, meteorology, petrology, and mineralogy.

In the *engineering sciences program*, emphasis centered on the fields of mass transfer, mechanics, thermodynamics, electrical circuits and electronics, as well as fluid mechanics and physical metallurgy. These studies included analyses and formulation of methods having general application for the efficient use of materials and energy. Among the recently productive grants in the program was one which resulted in the formulation of a physical explanation of the empirical laws of comminution of materials by evaluating the effect of particle size in the process.

Mathematics provides linguistic structures which are available when needed for the description of the physical world. Some examples of these abstract structures and their diverse employment are: Group theory which is used for the classification of crystals, in quantum mechanics, and in relativity theory; number theory which is a means for describing experimental design and cryptography; topology which is appropriate for the discussion of electrical networks and for many problems in fluid mechanics; mathematical logic which plays a role in the design and operation of high speed computing machines. The *mathe-*

mathematical sciences program supports research in this underlying mathematics and stimulates the production of young mathematicians devoted to such research. Emphasis was placed on covering, by a single grant, the most promising areas of investigation in active departments. Such grants encourage talented students to become acquainted with problems in several fields before becoming committed to one mathematical specialty.

The *physics program*, which has to do with the fundamentals of matter and radiation, reflected an increased interest in atomic and molecular structure. As in previous years, the major effort was directed toward studies of nuclear and solid state physics, especially the theoretical aspects. Advances in nuclear and spin resonance experimental methods have brought about an avalanche of many small but significant discoveries concerning the structure of atoms in the aggregate and of molecules. The physics of matter as revealed through low temperature experiments also was pursued with increasing vigor.

The *sociophysical sciences program* encompasses both the history, philosophy, and sociology of science and those areas where the social sciences converge with the mathematical and physical sciences. Grants under this program have supported studies on the factors in the acceptance of scientific theories; studies in the history of mathematics, physics, and metallurgy; and basic research in mathematical social sciences.

Support Programs Broaden Manpower Base

A significantly important plus value for science, attached to nearly every one of the 734 grants approved during the fiscal year, is the cumulative effect of research support on the Nation's science-manpower reservoir. Funds provided in the average Foundation grant support 1 or 2 graduate student research assistants and frequently a postdoctoral research associate. Thus, in addition to the Foundation's formal fellowship program (see *The Manpower Report*, p. 61), the research support program increases the total number of well-trained scientists available to the Nation. Young men and women, who might not otherwise find opportunity, are enabled to pursue avenues of research under mature investigators while, at the same time, continuing their formal academic training. Based on grants made by the Division of Biological and Medical Sciences and the Division of Mathematical, Physical, and Engineering Sciences during fiscal year 1956, some 900 predoctoral students and approximately 200 postdoctoral scientists served with mature investigators whose work was supported by the Foundation on recommendation of these divisions.

Some measure of the Foundation's contribution to the national reservoir of highly trained scientific talent is indicated in figures which represent support of young science students and scientists—indirectly, through the grants program, and directly, through the formal fellowships program. Total indirect support, as indicated immediately above, approximates 1,100 individuals; total direct support through predoctoral and postdoctoral fellowships was about the same. For fiscal year 1956, therefore, the Foundation assured opportunities for nearly 2,000 men and women to continue their scientific education and experience in laboratories of colleges and universities located throughout the country.

Believing that the science teacher is a better teacher as a result of having participated in actual scientific research, the interest and emphasis on the training of scientific talent is being expanded to include summer research programs for teachers of the small liberal arts colleges, and for high-school teachers, whose facilities for such pursuits are limited during the academic year.

THE FACILITIES REPORT

The contributions of scientific research and development to our success in World War II made it obvious that continued support of such research was essential to our country's safety and progress. Therefore, both the Federal Government and industry made large capital investments in research facilities, primarily for mission-oriented research. There remained, however, a great need for augmenting the support of facilities for basic research at the colleges and universities.

Improving the Scientist's Tools

During fiscal year 1956, the Foundation submitted to Congress its first significant request for funds for the support of research facilities. Current laboratory equipment is fast becoming obsolete for meeting the facilities' requirements of today's researcher in basic science. For the astronomer whose laboratory is outer space, or for the physicist studying the structure of the atomic nucleus, most telescopes and laboratory instruments are rapidly outmoded. Today's newest telescope is really a highly sensitive, wide-diameter, parabolic "dish" which, as the tool of radio astronomy, picks up cosmic static from outer space; today's instrument for studying nuclear structure is a huge nuclear reactor or accelerator. Similarly, progress in basic research in biology is sped forward when biologists have access to modern controlled-environment laboratories.

As the frontiers of knowledge are pushed forward, basic research becomes more and more complicated. Machinery and facilities for performing research become increasingly complex and costly. Meanwhile, resources of the universities, where basic research is an essential part of the educational process, have not kept pace with increasing costs. Colleges and universities, thus, have not been able to provide adequate research facilities to meet the insistent demands of an expanding economy and cold-war geopolitics. Lack of modern facilities for basic research not only retards research but postpones, as well, adequate training for scientists.

The once-popular conception that a scientist engaged in basic research requires only his brain and simple, oftentimes homemade equipment,

is erroneous. True, men rather than machines have been, are, and will be of primary significance in research. In some instances, significant research will continue to be accomplished by an individual scientist with outstanding creative imagination and relatively simple equipment.

However, the continuance of probing into the unknown, of seeking meaningful data and observation upon performance and characteristics of the building blocks of nature, requires complex and consequently expensive devices. As time goes on, it is anticipated that the future progress of research will depend in some fields of science upon an increasing ratio of research tools to scientific manpower. Production of necessary particles for research in nuclear physics, for example, is dependent upon equipment such as the nuclear accelerator and the nuclear reactor, all elaborate and costly devices. Acceleration of progress in many scientific and engineering fields through application of the electronic computer to complicated and extensive problems will require increasing numbers of computers of high speed and large memory capacity. Furthering of research on the nature and characteristics of the universe requires highly specialized astronomical equipment in locations favorable for such studies. In addition, the forwarding of research on the nature of life itself—the province of biology—requires modern laboratory equipment in locations favorable to studying life forms in their natural habitats. In all of these areas, and in other areas which may emerge, the national interest requires that adequate means be available for assisting scientists to perform research to the limits of their ability.

Support for basic research facilities and equipment by the Foundation is directed toward accomplishing the following objectives:

1. Improvement of the extent and quality of basic research in those areas where progress is dependent upon access to specialized or scarce and costly facilities not otherwise available.
2. Achievement of a sound geographic distribution of research by providing necessary research installations and equipment in regions where such items are scarce or unavailable.
3. Fostering research through increasing the competence of scientific personnel by providing opportunities for receiving training in the use of advanced or highly specialized scientific equipment.

On the basis of careful surveys by outstanding scientists in several disciplines, the Foundation has recommended as desirable national policy provision of Federal funds for construction or procurement of large-scale facilities and major equipment for scientific research, including research centers—when need is urgent; when provision of the

facility is clearly in the national interest; when technical bases are sound; and when funds are not available and cannot feasibly be stimulated from other sources.

Facilities for Research in Astronomy

During the summer of 1956, the Foundation allocated \$4 million for the construction of a radio astronomy facility in Green Bank, W. Va., to consist initially of a 140-foot paraboloid antenna and auxiliary equipment. The facility is designed to make available to radio astronomers in the United States a large telescope and facilities comparable to those available to scientists of other nations. In announcing the site selection, the Director pointed out that "colleges and universities which cannot undertake to provide radio telescopes out of their own resources will be enabled to begin research and training within their institutions knowing that the facilities of the radio astronomy observatory will be available for the completion of advanced research and training."

A grant of \$545,000 was also made to the University of Michigan to support continuing studies of sites and instrumentation for an optical astronomy observatory proposed to be erected in the Southwest. According to Robert R. McMath, Director of the McMath-Hulbert Observatory of the University: "The problems of astronomy require a wealth of basic data. At the present time such data are being gathered very slowly. Because of this slow rate, fundamental advances occur rarely, only about once in 25 years." He cited further the difficulty in obtaining funds from industry or from private foundations for a pure science such as astronomy. Dr. McMath pointed out that establishment of an observatory would enable scientists to take advantage of the revolution in astronomy techniques that are anticipated within the next decade or two.

The furtherance of education in astronomy is another compelling reason for establishing such facilities. It is believed that the existence of these facilities will encourage young astronomers to go into teaching by giving assurance that they will not have to forfeit research opportunities in so doing.

A Reactor for Nuclear Research

In a further effort to meet the research needs of present-day science, the Foundation, in the summer of 1956, made a grant of \$500,000 to help construct a nuclear reactor at the Massachusetts Institute of Technology, in Cambridge. The physics and metallurgy departments at

M. I. T. plan to use the reactor for research on the solid state, the department of food technology in the radiation sterilization of foods, the department of biology in radiation-induced mutations, the department of chemistry in radio-chemical investigations, the department of chemical engineering in radiation-induced catalysis, and the nuclear engineering group in reactor development studies. The Massachusetts General Hospital and other hospitals and medical schools in the Boston area are expected to use the reactor as a neutron beam source for cancer therapy.

The reactor will also serve importantly the useful purpose of educating engineers and scientists in the theory, design, and operation of nuclear reactors; in techniques for the production, handling, and measurement of nuclear gamma radiation and radioactive material; and in the principles and application of reactor instrumentation.

Support for Computing Laboratories

The Foundation approved as well the first of a series of grants to support computation centers and research in numerical analysis: \$38,000 to the California Institute of Technology; \$30,000 to the Massachusetts Institute of Technology; \$20,000 to Oregon State College; \$17,500 to the University of Washington; and \$30,000 to the University of Wisconsin.

The Foundation's computer-support program is designed to strengthen basic research in a number of fields by providing research investigators access to computing facilities. Only a few large computing centers around the country are available for basic research problems and these generally on a part-time basis only. Most computers are busy on a round-the-clock schedule on industrial problems and problems related to defense contracts. The general-purpose university computing laboratory does not have sources of support for basic research at present. Foundation assistance will help to establish or strengthen such general-purpose research laboratories.

Commenting on the Foundation program in support of computing research, the Director said:

The electronic digital computer has been growing in importance as a major research tool since World War II. The art of high-speed computation has now progressed to the point where many scientists feel that further progress in their fields will be seriously affected by access to the techniques and facilities for computation. At least two obstacles must be overcome in making theoretical advances in scientific research: formulation of adequate conceptual models of a natural proc-

ess, and calculation of anticipated observations in a particular instance of the process.

Recent experimental advances in physical and engineering sciences have made previously relevant linear mathematical models inadequate for representing many interesting processes or, in cases where linear analysis remains relevant, have increased enormously the size of the linear system employed. Use of mathematical models in biological and sociological research has induced consequences similar to those in the physical sciences. It is an historically remarkable coincidence that, parallel to the emergence of these difficulties, a means of dealing with them has been found in the art of high-speed computation.

The Director added that the need for adequate computer facilities for basic research problems must be considered primarily from an interdisciplinary point of view. In addition to the obvious interdependence of computation and research in mathematics and physics, other mathematical, physical, and engineering sciences are utilizing computational techniques at an increasing rate. Problems in biological and sociological sciences are also becoming increasingly amenable to numerical analysis.

Provision of computer facilities for basic research is filling an important need in training mathematicians at all levels in formulating scientific problems. At present only a fraction of the number of mathematicians needed for computer work are being graduated at the various levels. Scientists in other fields, also, must be trained in methods of applying computer techniques to their own problems. In addition to the scientists and mathematicians whose interests are in basic research, an increasing number of trained specialists are required to man the big machines used on industrial and defense problems.

Yet another compelling reason which prompts Foundation support of computation centers is the need for more research to advance the art of computation itself. Effective utilization of existing machines requires research in numerical analysis. Scientists are daily encountering problems beyond the capacity of existing machines, and, if the need for better equipment is to be met, investigation into the theory and engineering of computing machines is essential.

Biological Research Facilities

During the summer of 1956, the Foundation allocated three-quarters of a million dollars for the support of biological field facilities. With few exceptions, the Foundation has been the only Federal agency from

which biological field research stations could obtain partial assistance for general operating support, for renovation and repair, and for modernization of physical plant and equipment. The Foundation provided only limited assistance prior to 1956, and will provide a moderate level of support in 1957.

Research at academic institutions in the biological sciences operates under definite handicaps because, generally speaking, colleges and universities are located in urban or suburban areas where the immediate surroundings do not include source materials for biological studies. Consequently, biological field stations have been established in relatively remote locations where the natural environment provides conditions favorable for biological research. Some of these conditions are the ready availability of living source material for laboratory studies, the presence of unique flora and fauna, and the existence of particular environmental conditions such as may be found in Arctic, desert, high altitude, marine, terrestrial, or fresh water habitats. At the present time, there are 52 such stations of varying size, quality of equipment, and accommodations for staff; 47 are located in the United States or possessions in the North American Continent, 1 is in the Canal Zone, and 4 additional United States stations are found in the Atlantic and Pacific island sites. Support from private sources is such that, of the 52 American biological stations, very few are functioning under conditions that could be termed better than austere.

As a result of the difficulties encountered by biological field stations in securing funds, necessary repairs have been postponed; research equipment has become obsolete and inadequate; larger stations are acutely short of laboratory and housing space for students and independent investigators; field equipment, boats, etc., are becoming obsolete and need replacement; station libraries have fallen far behind in the acquisition of up-to-date reference and study material. The consequence has been that research and training programs have been retarded, and in some instances, abandoned.

In addition to their importance for the conduct of research as such, biological field stations have a significant value for:

1. Training younger scientists under the direction of experienced and mature biologists.
2. Providing a means whereby faculty members of colleges and universities can not only carry on research during the summer months, but also secure the stimulation of interests to be gained from close association with active research biologists.

Numerous requests received by the Foundation for assistance in providing needed equipment, renovation or construction of necessary structures, and costs of operation were carefully considered by the staff of the Foundation, by a committee of eminent biologists not directly involved in the operation or administration of field stations, by the Divisional Committee for Biological and Medical Sciences, and by the National Science Board. All have concurred that support for these facilities is vital.

THE MANPOWER REPORT

If the United States is to maintain its position of world technological leadership, it must improve the quality of science instruction in its schools and colleges during the approaching period of vastly increased enrollments.

The nature of the problem, which is of primary concern to the Foundation's Division of Scientific Personnel and Education, can be illustrated by the magnitude and growth of the number of scientists and engineers in the United States. Between 1930 and the present, the number of scientists in this country quadrupled and the number of engineers doubled, while population increased 35 percent. Present estimates are that demand for scientists and engineers will continue to increase at an accelerated rate.

There are approximately 700,000 engineers and 250,000 scientists in the Nation. They actually represent a small proportion of the total population—only about one-half of 1 percent. The technological leadership which the United States has achieved depends primarily on the high quality of this small group and upon the Nation's industrial organization. As the group enlarges, high quality must be maintained, for creative scientists and engineers hold the keys to scientific advances of the future. (See figure 9.)

New demands for scientists from 1950 on met the "thin generation"—the small age groups born prior to the 1940's. With cold war pressures and the needs of technological expansion, demands have increased and the competition for young scientists has become severe.

Since 1954 the number of college graduates has been increasing. At present, our college population is higher than it has ever been. Moreover, all indications are that college and university enrollments will rise even more rapidly in the near future. The increase to date has resulted primarily from the great proportion of our young people attending college. In the 1960's the sharp rise in numbers that is likely to double enrollments will result primarily from the increase in postwar population reaching college age. (See figure 10.)

PRIVATE INDUSTRY EMPLOYS MORE THAN 1/2 OF OUR SCIENTISTS AND ENGINEERS

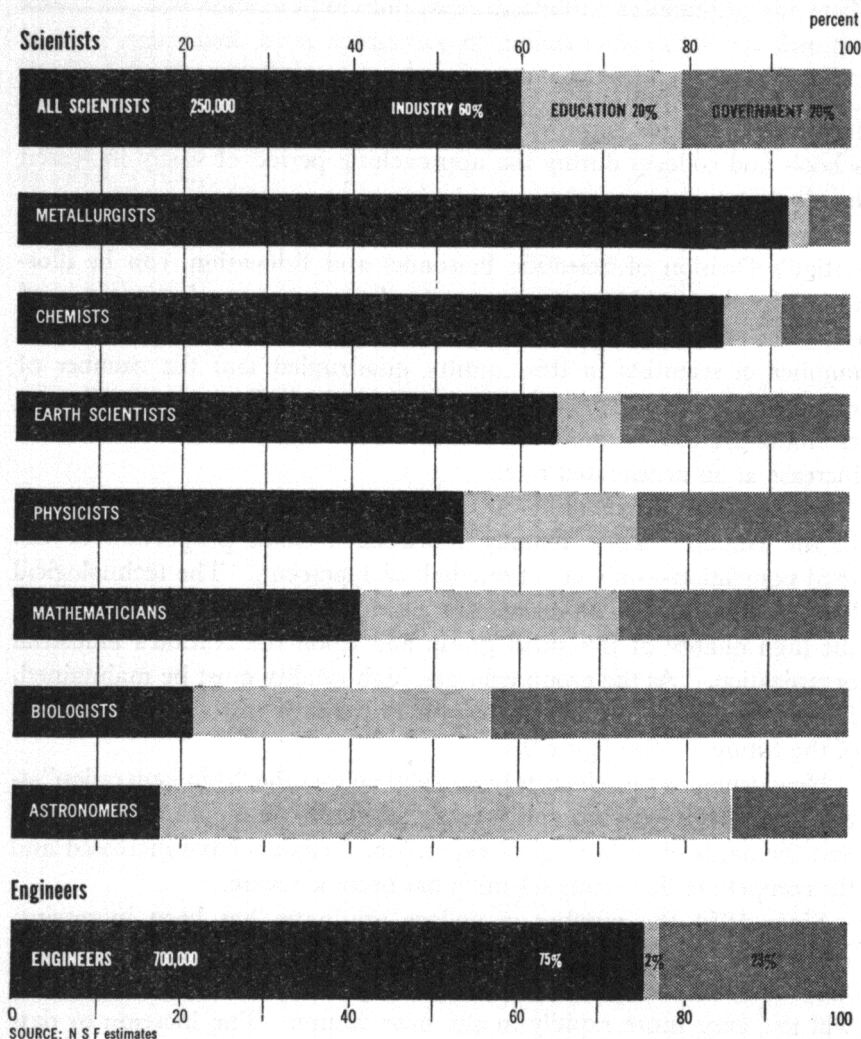
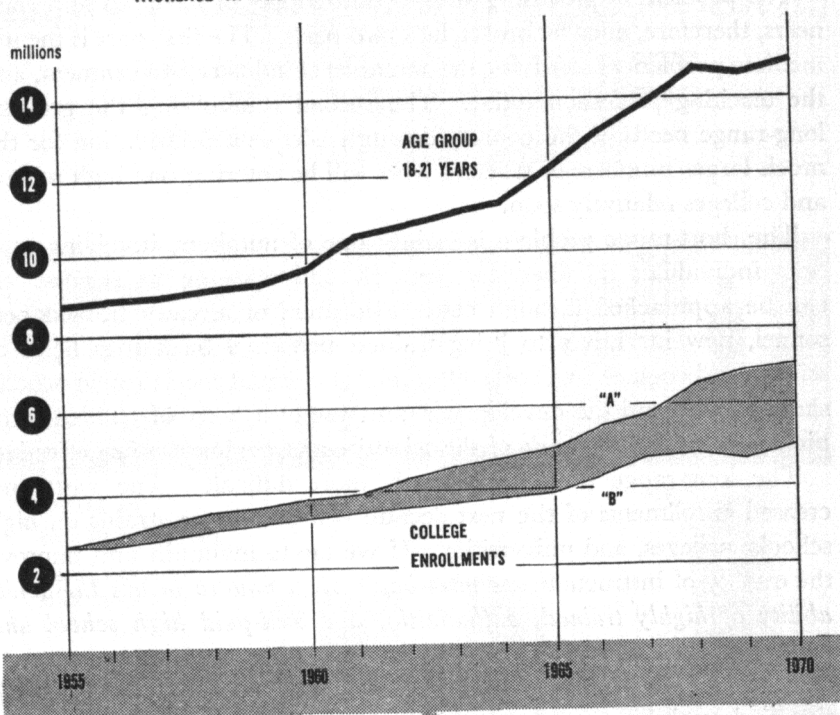


Figure 9.—Distribution of scientists and engineers by type of employer.

COLLEGE ENROLLMENTS IN FUTURE YEARS WILL GROW WITH THE INCREASE IN THE POPULATION OF COLLEGE AGE



YEAR	AGE GROUP 18-21	ENROLLMENTS	
		"A"	"B"
Thousands			
1955	8,575	2,755	2,755
1956	8,774	2,996	2,839
1957	8,927	3,232	2,949
1958	9,055	3,450	3,041
1959	9,284	3,623	3,119
1960	9,581	3,778	3,221
1961	10,202	3,964	3,349
1962	10,664	4,212	3,568

YEAR	AGE GROUP 18-21	ENROLLMENTS	
		"A"	"B"
Thousands			
1963	11,010	4,451	3,726
1964	11,220	4,657	3,853
1965	12,117	4,860	3,953
1966	12,901	5,346	4,295
1967	13,709	5,832	4,710
1968	14,457	6,318	4,725
1969	14,309	6,901	4,695
1970	14,512	6,949	4,905

SOURCES: U. S. Bureau of the Census, U. S. Office of Education, Fund for the Advancement of Education, and the National Science Foundation.

Projection "A"—Based on estimated population increase and on a 1 percent annual increase in the rate of college attendance by the 18-24-year age group.
 Projection "B"—Based on estimated population increase only.

Figure 10.—Trends in population growth of the 18-21-year age group and in college enrollments.

A Two-Part Problem

The problem of providing an adequate supply of scientists and engineers, therefore, must be broken into two parts. The first part is the immediate problem of satisfying the demands of industry, government, and the teaching profession today. The second is satisfying the growing long-range needs of the country through adequate preparation for the much larger numbers of students who will be entering our high schools and colleges relatively soon.

The short-range problem is mainly one of numbers, involving as it does individuals qualified for research and teaching in science. It can be approached through better utilization of already trained personnel, new incentives to bring trained personnel back into fields of science and engineering, special training of essential specialists in acutely short supply, and the development and use of a body of trained technicians to make the work of the scientist and engineer more effective.

The long-range problem is much more difficult. The vastly increased enrollments of the next decade will put severe strains on high schools, colleges, and universities. If we are to maintain and improve the quality of instruction, *we must begin right now to insure the availability of highly trained, enthusiastic, and well-paid high school and college teachers.*

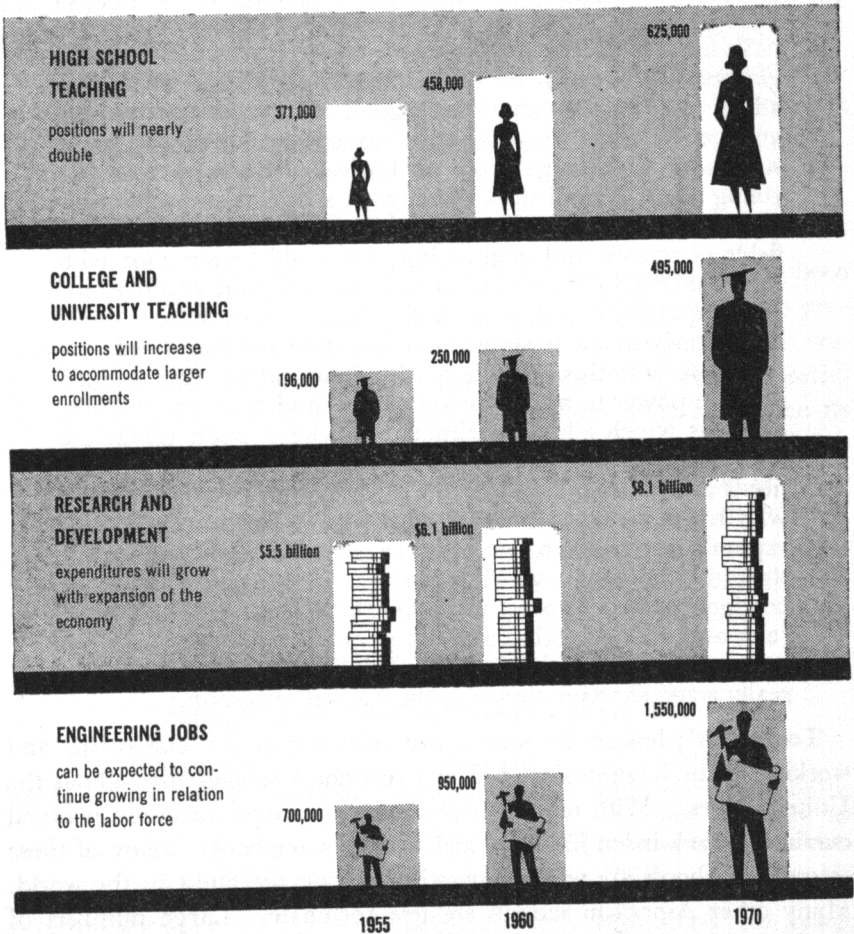
Although we cannot accurately measure long-range needs for scientists and engineers, much less predict their areas of specialization, we do know that such needs will develop. We must make sure that the oncoming supply of scientists and engineers keeps reasonable pace with increasing demand. If at any time it appears that demand will seriously outrun supply in particular specialties, consideration will have to be given to additional and perhaps more radical measures.

All evidence available today indicates that science and engineering are now attracting a gradually increasing proportion of our talented young people. Recent publicity emphasizing the needs of industry and government for more scientists and engineers, and the many special programs of various groups launched for the purpose of motivating more of our young people into science and engineering, appear to be reaching our most talented youth. This fact imposes an even greater obligation to provide these able students with proper facilities and able teachers.

Thus the problem of numbers, when attacked with vigor and imagination, will change its character by the middle of the next decade. The continuing problem will be to assure that the education available to our young men and women who choose careers in science is geared to their needs and talents as individuals and to the Nation's increasing dependence on science and technology.

The health of our own society and our ability and capacity to assume increasing responsibilities as a world power depend heavily upon the quality of science education throughout the country. (See figure 11.)

FUTURE GRADUATES IN SCIENCE AND ENGINEERING WILL BE REQUIRED TO HELP STAFF MANY EXPANDING OCCUPATIONS AND ACTIVITIES AMONG THEM . . .



Source: National Science Foundation, *Trends in the Employment and Training of Scientists and Engineers*, 1956.

Figure 11.—Future need for science and engineering graduates.

Quality, Depth, Adaptability, and Up-To-Dateness

The case for quality is set forth succinctly by James R. Killian, Jr., President of the Massachusetts Institute of Technology:

* * * The sustained scarcity of professional manpower in these fields (science and engineering), having been widely proclaimed, is now generally recognized, and its handicap to the Nation is becoming understood.

Not so well recognized and understood or stressed is the qualitative nature of the shortage. We have a shortage of young engineers competent to handle new, advanced technologies. We have a shortage of research scientists and engineers (the demand for whom has been doubling every decade). We have an acute shortage of scientists whose creative and conceptualizing powers are exceptional. We have, in summary, a shortage more of basically educated, versatile young talent than of mere numbers of scientists and engineers. There is indeed a shortage of numbers in many but not all fields of science and engineering; we could better cope with such a shortage did we not also have an even more severe shortage of quality, depth, adaptability, and up-to-dateness.

Similarly in the basic sciences our most pressing needs are for those scientists who have the imagination and trained creative power to make the discoveries and generate the new concepts which advance science. We hear much about the need for more basic research and funds to support it. These needs are great, but greater still is the need for more scientists who have the trained talent, the motivation, and the conceptualizing power to make basic research really basic. In stressing the need—which has always been present—of exceptional talent, I do not minimize the critical shortage of the rank and file of good competent scientists. Flag officers are not enough to provide a strong scientific attack force, but the really acute shortage now is in the flag officer group.¹

Tomorrow's leaders in science are studying in the classrooms and working in the laboratories of today's secondary schools throughout the United States. With modern technical equipment, carefully planned curricula, stack-laden libraries, and excellent textbooks, many of these secondary schools are without question among the finest in the world. Many other American schools are less fortunate. Large numbers of our high school laboratories must make use of antiquated equipment; students must study from outdated texts; too little relationship or continuity exists between high school and college science. Most serious of all is the fact that, of necessity, large numbers of our high school mathe-

¹ The President's Report, Massachusetts Institute of Technology, 1955.

matics and science students must be taught by teachers who, through lack of adequate training and in other ways, are not fully qualified for the task which they conscientiously are trying to perform. In the last analysis, teachers determine the quality of instruction. Able and dedicated teachers not only impart knowledge—they generate a desire for it. High quality in our future scientists requires high quality teachers. The present short supply of highly capable high school science and mathematics teachers, as well as the certain need for more of them in the near future, constitute the most critical and difficult problem in the effort to maintain an adequate supply of top quality scientists and engineers. No less important is the problem of staffing the science and engineering departments of the colleges and universities as they, too, are beginning to feel the impact of rapidly expanding enrollments.

Summer Institutes for Science Teachers

The need for the improvement of science teaching has always been recognized as one of the major problem areas in the Foundation's program planning. After a period of careful study, an action program was launched in 1953 when the Foundation underwrote the first of a series of summer institutes for high school and college teachers. Since its inception, the summer institutes program has been praised by scientists and educators. Toward the close of the fiscal year 1956, the Foundation announced that it had completed arrangements for sponsorship of 25 institutes to be held during the summer of 1956 in universities, colleges, and other centers of research widely scattered across the Nation—14 more than were held in the summer of 1955. Information about the 1956 institutes is summarized in the table below.

National Science Foundation Summer Institutes, 1956

<i>Host institution</i>	<i>Science area</i>	<i>Participants</i>
Wisconsin State College at Eau Claire.	Astronomy	High school and college teachers (primarily for teacher-training instructors).
Indiana University	Biology	High school teachers.
University of Utah	Biology	High school and college teachers.
Botanical Society of America, at Cornell University.	Botany	College teachers.
Indiana University	Chemistry	College teachers.
Montana State College	Chemistry	High school and college teachers.
Oregon State College	Chemistry	College teachers.
Iowa State Teachers College	Mathematics	High school teachers.

National Science Foundation Summer Institutes, 1956—Continued

<i>Host institution</i>	<i>Science area</i>	<i>Participants</i>
University of Michigan	Mathematics	College teachers.
Williams College	Mathematics	High school and college teachers.
American Society for Engineering Education, at the Argonne National Laboratory (cosponsored with AEC).	Nuclear Energy . .	College teachers (engineering instructors).
American Society for Engineering Education, at the Brookhaven National Laboratory (cosponsored with AEC).	Nuclear Energy . . .	College teachers (engineering instructors).
University of Arkansas	Natural Sciences . .	High school teachers.
American University	Physical Sciences . .	High school teachers.
Marshall College	Physical Sciences . .	High school teachers.
Oak Ridge Institute of Nuclear Studies.	Physical Sciences . .	High school teachers.
Oak Ridge Institute of Nuclear Studies.	Physical Sciences . .	College teachers.
University of Rochester	Physics	High school teachers.
University of Wyoming	Physics	High school and college teachers.
Duke University (cosponsored with AEC).	Radiation Biology . .	High school teachers.
Harvard University (cosponsored with AEC).	Radiation Biology . .	High school teachers.
University of New Mexico (cosponsored with AEC).	Radiation Biology . .	High school teachers.
Alabama College	Science	High school teachers.
Pennsylvania State University	Science	High school teachers.
Wesleyan University	Science	High school teachers.

These institutes provided some 1,300 teachers with opportunities to attend science courses designed especially for them and conducted by scientists noted for competence in their fields and skill in presentation. Grants supporting the 1956 institutes provided instructional costs to host institutions as well as stipends and dependency allowances to participating teachers sufficient to defray costs of attendance. During 1957, some 95 summer institutes, serving about 4,750 teachers, will be held under Foundation auspices.

Academic Year Institutes

During fiscal year 1956 a new and extended science-teacher-training plan was inaugurated—the academic year institute. Two grants were made in 1956, 1 to the University of Wisconsin and 1 to Oklahoma A. & M. College, to support academic year institutes for high school teachers of science and mathematics. Both institutes, to be conducted

during the academic year 1956-57, will offer special courses of study in science and mathematics planned cooperatively by members of the science, mathematics, and education departments in the host institutions. Work in the courses designed for high school teachers may be applied in partial fulfillment of requirements for the master's degree. Grants provide for stipends of \$3,000 to 50 teachers in each institute and additional allowances for dependents and travel.

Commenting editorially on the subject of the Foundation's program of institutes, the American Association for the Advancement of Science stated in *Science*, May 25, 1956:

The summer institute program of the National Science Foundation, now extended at Wisconsin and Oklahoma A. & M. to include yearlong institutes, has made a major contribution in making available content courses for science and mathematics teachers. This is one of the most significant developments in teacher education in the past 20 years.

Helping Teachers and Students of Science

Other activities designed to improve science teaching and to motivate youngsters toward science careers have been supported during the past fiscal year.

Adequate library facilities are not readily accessible to many small schools in outlying communities of the Nation. Better to serve the needs of students in these schools interested in science, an experimental traveling science library was supported as a joint project with the American Association for the Advancement of Science. Six boxes of 25 books each were carefully selected by competent scientists in the several fields of science. The boxes were rotated each month among several schools. Response has been favorable, and many additional high schools seek participation in the program.

Administered by the Oak Ridge Institute of Nuclear Physics, another project was assistance to science teaching in secondary schools. A group of selected high school teachers was given 3 months' training in Oak Ridge including the 4-week Oak Ridge Summer Institute for Secondary School Science Teachers. These teachers will spend the 1956-57 academic year traveling and giving lecture demonstrations in science classes at various high schools. Objectives of the program are to stimulate interest in science and in science teaching, to improve teaching methods, and to provide a greater number of secondary school students with a deeper appreciation of science and scientific careers.

The first Foundation-supported visiting scientists program was conducted by the Mathematical Association of America in the academic

year 1954–55. Five eminent mathematicians were engaged for most of the year in weeklong visits to small colleges. The 70 colleges visited were unanimously of the opinion that the visitors provided a strong stimulus to students and teachers. This mathematics program was continued in fiscal year 1956, and, in addition, similar programs were initiated in chemistry and biology with the aid of grants to the American Chemical Society and the American Institute of Biological Sciences.

During fiscal year 1956, the Foundation awarded a grant of \$40,000 to Science Service for partial support to extend the geographic area covered by the Science Clubs of America and to aid sponsors of science clubs to develop suitable materials for the use of young club members in pursuing their interest in science. Growth of science clubs in recent years and the continuing devotion of local citizens to activities of the clubs and science fairs indicate strongly that this work is greatly worthwhile in interesting youth in science.

Several conferences and colloquia held during the year served to bring together educators, scientists, and Federal officials who sought to improve science curricula and teaching methods. Notable were the Colloquium of College Physicists; the Conference on the Identification of Creative Scientific Talent; the Conference of Summer-Institute Directors; a conference of executive officers and educational committee chairmen of professional scientific societies designed to encourage the selection of technical careers and improve the training of talented students; and a conference on teacher education in the sciences sponsored jointly by the American Association for the Advancement of Science, the United States Office of Education, and the Foundation convened to exchange ideas on the improvement of science teachers, to explore ways to bring about better understanding between scientists and professional educators, to plan courses of cooperative action, and to consider possibilities for new ways of training science teachers.

Call to Action

Programs designed to improve science teaching are directed toward the essential objective of increasing the numbers of well-trained scientists and engineers. In company with other parts of the science community, the Foundation has felt that unless forthright measures were taken, and taken speedily, growing shortages of well-qualified scientists and engineers would endanger the Nation's economy, its health, and its defenses. Institutions, private and public, colleges and universities, business and industry, trade and professional organizations, no less than the National

Science Foundation, had been watching with apprehension the declining percentages of students in secondary schools and colleges who elected basic courses in the sciences and mathematics.

In many quarters—in education, industry, and government—programs of action were initiated. The National Education Association and its affiliates, such as the National Science Teachers Association and the National Association of Biology Teachers, have actively participated in programs for improving science teaching. Many trade associations organized committees on education and community committees, and stimulated a general nationwide effort to encourage youth to pursue science careers. The National Association of Manufacturers, the scientific professional societies, including the American Chemical Society, and their affiliates and associates in industry and science encouraged members to assist in the effort. Great industrial organizations—General Electric, Du Pont, General Motors, and others—issued informative and challenging pamphlets and brochures pointing up their growing needs for well-trained scientific and technical manpower and the opportunities available to promising young men and women.

Congress further stimulated the national-alert effort by holding public hearings which served to crystallize public opinion as industrialists, educators, and Government officials testified to the growing need for well-trained scientists and engineers. The Joint Committee on Atomic Energy caused to be published in substantial quantity the pamphlet, *Engineering and Scientific Manpower in the United States, Western Europe and Soviet Russia*, and distributed it to all who were interested.

Response

From secondary schools in communities across the Nation there came reassuring evidence during fiscal year 1956 that increasing numbers of students were enrolling in science courses. In May 1956, the American Association for the Advancement of Science was able to report that the “downward trend in science and mathematics had ceased and enrollments in these courses are increasing at a faster rate than total enrollments.” Guardedly, the AAAS prefaced its report with an “if”—if the results of its survey of secondary school enrollments, 1953–55, covering 1.15 million students in 39 States and 80 school systems were representative of the Nation, then the “downward trend” had indeed come to an end. The sampling was large enough, however, to give substance to a belief that a greater proportion of our youngsters were indeed choosing courses in science and mathematics—something of a breakthrough in itself, and most encouraging manpower news to the science community.

Fellowship Aid

Having contributed, with industry and the educational community, toward stimulating youth to pursue science careers, the National Science Foundation seeks, as well, to provide opportunities which will carry talented youth, who have already chosen science as a career, to the highest levels of training in engineering and science. This objective has been met successfully through the predoctoral and postdoctoral fellowship program. The aim of the predoctoral program is to seek out the most able science students interested in training beyond the baccalaureate degree and to afford them an opportunity to spend full time at the institutions of their choice and in the type of training they desire so that each fellow can develop his potentiality as a scientist to the fullest. (See figure 12.)

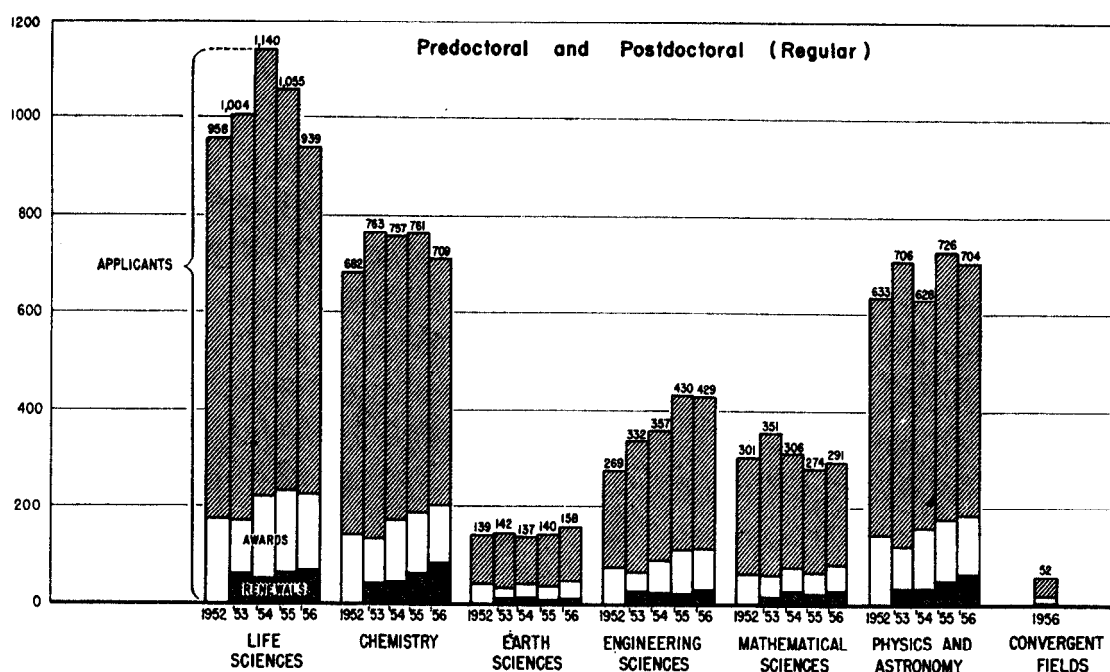


Figure 12.—Pre- and post-doctoral fellowships awarded by the National Science Foundation by field of science, fiscal years 1952–56.

During the past fiscal year, the Foundation inaugurated a new fellowship program—the senior postdoctoral program—designed to satisfy the need for support for more advanced and mature scientists than those who have but recently received the doctorate. Forty such fellowships were granted during this first year. Specific objectives of the senior postdoctoral program are:

1. To provide opportunities for scientists who have demonstrated superior accomplishments in a special field to become still more proficient in their respective specialty by studying and doing research in outstanding laboratories.

2. To provide opportunities for scientists who wish to do so to study and undertake research in fields of science complementary to those in which they were trained, thus raising the level of our scientific potential by assuring increased recognition of, and competence in, interdisciplinary fields of science.

3. To enable teachers of science to spend a year in revitalizing their teaching through study and research at a center where these persons will be in daily contact with productive scientists.

In recent years, increasing recognition has been given to the importance of breaking down artificial barriers between fields of science and to the need for interdisciplinary training. The interdisciplinary areas, however, have suffered because most of those currently working in science received a type of advanced training which is poorly suited to the specific requirements of the interdisciplinary approach. Hence, in addition to providing advanced training opportunities in the traditional disciplines, the senior postdoctoral fellowship program provides an opportunity for competent persons to obtain complementary training in fields related to but somewhat outside their own specialty.

On March 15, 1956, the Foundation announced the award of 775 predoctoral graduate fellowships and 80 postdoctoral fellowships for advanced study in the natural sciences for the academic year 1956-57. Forty senior postdoctoral awards were announced on March 20. The number of applicants and awards by State and region, a complete list of fellowship holders, and a list of institutions attended by the fellowship holders as undergraduate and graduate students is given in the table in appendix D, p. 152.

National Register of Scientific and Technical Personnel

Quantity and quality of science manpower become meaningful as a national resource in the end product of a third program of the Division of Scientific Personnel and Education—registration of, and information about, United States scientists and engineers. With support from the Foundation, the Nation's professional organizations of scientists and engineers cooperate in the establishment and maintenance of the National Register of Scientific and Technical Personnel. Serving the Nation as a focal point for data on numbers and kinds of scientists, the Register is a device for mobilization whereby scientific and technical personnel may be identified and located quickly under conditions of national emergency. It is also a source for the development of data covering the Nation's scientific and technical manpower resources from the standpoint of supply and characteristics. Approximately 140,000

scientists and engineers are now included in the Register and as many as 200,000 are expected to be included on the basis of present standards of coverage.

Clearinghouse Activities

Utilizing the data about United States scientists and engineers from the Register and other sources, the Clearinghouse for Scientific Personnel Information acts as a central point for the collection and dissemination of information about scientific and technical personnel with reference to training, employment, supply, and demand. Data necessary for an understanding of the adequacy of present and potential supply of science manpower range from relatively abstract psychological problems of creativity to practical questions of numbers now employed in research and development as against estimates of science manpower needs 10 or 15 years from now under a variety of possible conditions. Prior to establishment of the Clearinghouse, there had been no focal point in the Federal Government where such comprehensive data could be obtained. The factbook, *Scientific Personnel Resources*, prepared by the Clearinghouse, summarizes data on the supply, utilization, and training of scientists and engineers. It quickly established the Clearinghouse as an authoritative center for information of this type.

Other publications issued or supported by the Clearinghouse during fiscal year 1956 served as measurements of United States science-manpower resources. They include:

1. *Education and Employment Specialization in 1952 of June 1951 College Graduates*, the report of a survey by the Foundation of a sample of 50,000 college graduates of June 1951 in all fields.

2. *Baccalaureate Origins of Science Doctorates Awarded in the United States, 1936-50*, the report of the "Doctorate Survey" which has been supported by the Foundation for a number of years. The surveys, preparation of the report, and publication were performed by the National Academy of Sciences-National Research Council under financing by grant.

3. *Trends in the Employment and Training of Scientists and Engineers*, prepared primarily for the use of the National Committee for the Development of Scientists and Engineers. It contains a brief summary of trends in the growth of scientific and technological employment in the labor force, the current situation with regard to the employment and training of scientists and engineers, the outlook with regard both to educational trends and anticipated needs for scientists and engineers.

4. *Highlights of a Survey of Graduate Student Enrollments, Fellowships, and Assistantships, 1954* (Scientific Manpower Bulletin No. 5), containing preliminary information from a survey conducted by the Foundation.

5. *Shortages of Scientists and Engineers in Industrial Research* (Scientific Manpower Bulletin No. 6), containing information from a series of interviews with industrial executives on scientific manpower shortages by the Bureau of Labor Statistics in connection with a larger survey of scientific activity in industry for the Foundation.

THE COMMUNICATION REPORT

Time saved for scientists in searching out what is already known is time they can actively spend on research. Improvement in the communication of scientific information is reflected in improved use of scientists' time—in effect, equivalent to an increase in the number of scientists available. The National Committee for the Development of Scientists and Engineers, appointed by President Eisenhower, has noted that “a 10-percent improvement in the utilization of engineers would be equivalent to a 10-percent increase in the supply.”

Scientific Information Services in the United States

Reference publications in the United States have been built up over a period of many decades, primarily by the scientific societies. Some fields are very well served by large, comprehensive abstracting services in English. Chemistry, for example, is thoroughly covered by *Chemical Abstracts*. In some other fields a multiplicity of services do part of the job, but coverage is not complete. For example, in biology, the largest service, *Biological Abstracts*, covers not more than 10 to 20 percent of the literature, and many smaller specialized services try to do other parts of the job. Still other fields of science are not covered at all in English by periodic reference services. Geophysics is an example. Nearest approach to adequate coverage of geophysics in any language has been achieved by the Institute of Scientific Information of the U. S. S. R. These examples indicate the complexity of the problem of providing adequate scientific information services where a unified national service is not provided.

Role of the Foundation

Axiomatic in the scientific community is the statement that no piece of research is complete until it is published. As the pace of scientific research accelerates and scientific publications multiply, it becomes increasingly difficult for a scientist to learn about and obtain access to everything that is published in this field. Accordingly, the Foundation is trying to make it easier for scientists to locate and acquire the published

results of research. Specifically, the objective of the Office of Scientific Information is to ensure that any United States scientist can obtain any item of unclassified scientific information he needs, no matter where it originates, and to develop improvements in the organization and availability of scientific information on behalf of all United States scientists.

Published results of scientific research are obtainable from many sources, private and public, at home and abroad. It is most important that significant scientific research publications, whether published in Great Britain, Sweden, Russia, or any other nation of the world, be identified, obtained, translated, if necessary, and distributed to interested scientists in the United States. Similarly, unpublished reports from university laboratories, industry, and the Federal Government are an important medium of scientific communication. The Office of Scientific Information is conducting programs to make such reports more readily available. Additionally, this office seeks to open new, and to keep open existing, channels of communication among scientists through partial support of scientific journals and reference aids and through the support of research directed toward more efficient organization, processing, and storing of information for rapid search.

Documenting the Results of Scientific Research

Improved methods of storing and searching for scientific information will release valuable time for scientists to pursue creative research. A promising approach is the mechanization of systems to store and recover science information. Although the electronic computers developed in recent years are incredibly rapid in processing numerical data, systems for indexing and classifying scientific information which take advantage of machine capabilities remain to be developed. Here the study of language becomes important, because it is necessary to convert the conventional language in which information is usually printed into a more regularized machine language and it is desirable to do this mechanically. Of course, language studies are also basic to the development of systems for mechanical translation from one conventional language to another. The Foundation is supporting language studies directed toward mechanical translation at the Massachusetts Institute of Technology and at Georgetown University.

In an effort to review research on information problems and to identify areas where additional research is needed, the Foundation supported in May 1956 a meeting of representatives of the Department of Defense, the National Bureau of Standards, and the Patent Office, as well as experts drawn from such fields as linguistics, logic, information theory,

operations research, computer design, and library science to discuss the need for additional fundamental research on the organization of information and the contribution that might be made by the several fields represented. During the fiscal year, the Foundation supported, as well, a feasibility study at the Case Institute of Technology, Cleveland, to determine whether the methods and techniques of operations research could be applied to the area of scientific communication to bring about increased understanding of the entire pattern of information exchange among scientists and to point up those components of the system in greatest need of attention.

Support for Scientific Publications

Until better documentation methods have been developed, however, the Foundation continues to support sound projects designed to make as effective as possible existing publications and reference services required by research scientists. All scientific publications seeking Foundation support are first evaluated by competent scientists in the particular field. Only those deemed especially important for the progress of research in that field are supported. The Foundation's program in support of scientific publications is designed to carry scientific journals and reference tools through genuine emergency periods and to help publish scientific monographs or reference volumes which could not be published without partial support.

Direct emergency support was granted during fiscal year 1956 to the Transactions of the American Mathematical Society and to two new scientific journals in the fields of forest science and of limnology and oceanography. The American Mathematical Society has reported that the extra volume of the *Transactions* made possible by the Foundation grant has speeded up publication of important mathematical discoveries, thus benefiting the whole course of mathematical research in the United States. *Forest Science*, one of the new journals, completed its first year of publication with some 900 subscribers and with no operating deficit. In this instance, the support of the Foundation was actually an agreement to underwrite any deficit encountered up to a certain amount in each of the first 3 years of publication; it has therefore required no Government funds to date and quite possibly none will be needed.

With respect to scientific reference publications, the Foundation provided financial assistance to important abstract journals, such as *Biological Abstracts* and *Applied Mechanics Reviews*. Support to *Biological Abstracts* was contributed jointly by a number of Federal agencies engaged in biological research and enabled the journal to

bring its annual indexes up to date with the 1955 volume, thus making the published abstracts more accessible.

During the past year the Foundation has supported a number of more specialized reference aids and services:

1. A critical compilation of crystal data by the American Crystallographic Association.
2. The analysis and correlation of visual observations of variable stars by the American Association of Variable Star Observers.
3. A punched card catalog of double star measures at the Lick Observatory.
4. The Chemical-Biological Coordination Center of the National Research Council.

In most instances where the Foundation supports publication of indexes, catalogs, and other highly specialized tools, the work of compiling the information has already been done. Foundation assistance simply makes publication possible.

Making Federal Research Results More Accessible

More than 20,000 unclassified scientific reports constitute the first appearance in print of much of the newest and most significant scientific information developed today when issued each year by the hundreds of organizations engaged in Government-sponsored research. The Office of Scientific Information of the Foundation began, during the past fiscal year, to help make this storehouse of research information as available to scientists everywhere as are papers published in conventional scientific journals. For several reasons this program contributes importantly to the progress of United States science:

1. Significant data in a sizable fraction of the reports either never are conventionally published or do not so appear for several years (one study of approximately 1,100 reports showed that for fewer than half were the important contents fully published within 2 to 3 years).
2. Drastic condensations required for journal publication make necessary continuing availability of complete reports.
3. Access to negative results, and other data not acceptable to journals, are important in avoiding undesirable duplication of research efforts.
4. No existing service fully meets the information needs of the scientists pursuing basic research.

Its program for improving the accessibility of this significant Government-supported research is being developed by the Foundation in three phases, each of which is keyed to using the facilities of existing Federal establishments. In the first instance, the Foundation now partially supports the Office of Technical Services (OTS) of the Department of Commerce in the interest of helping the research scientist learn what reports are being issued and how he may obtain copies of those which interest him. For several years, the OTS has published the monthly abstracting journal, *United States Government Research Reports*, offering for sale all documents listed therein. Prior to fiscal year 1957, the OTS announcements have been predominantly reports of interest to industry. Foundation support now enables it to give comprehensive coverage, as well, to reports on basic scientific research.

Secondly, the Foundation now provides partial support for a report-reference project in the Science Division of the Library of Congress, making it possible for a research scientist to consult specific reports of interest to him. Here, open card and book catalogs are maintained covering unclassified scientific reports on Government-sponsored research. Any scientist may use these catalogs and have made available for his review copies of any report cataloged.

Finally, the Foundation has established within its Office of Scientific Information, a Government Research Information Clearinghouse which provides the research scientist with general counsel and assistance in his quest for information regarding Government-sponsored research in his subject field. Experienced in report reference work, the Clearinghouse staff helps scientists find out where research is going on within Government in any given field; whether scientific reports in any area have been or are being issued; and how copies of desired reports can be obtained. An important aspect of the Clearinghouse program is the preparation and maintenance of an inventory of scientific-information activities in the Federal Government.

Importance of Research of Other Nations

To the research scientist in a particular field, the results of research achieved by his colleagues abroad are as important to him as those achieved by his associates at home. If he is satisfied that a particular area of his field has been competently explored, whether in Chicago, Moscow, or Paris, he can with assurance begin to attack the problem from other approaches. Well-integrated support of basic research, therefore, must include an active program to place in the hands of United States scientists the best of foreign research in the language in which they

work—English. Consensus among the scientific community is that much of the published research of the U. S. S. R. is potentially most valuable to United States science. During the past fiscal year, the Foundation supported a sizable program of translation of Russian research publications in physics, mathematics, and biology.

The Russian *Journal of Experimental and Theoretical Physics* began to appear early in fiscal year 1956 in complete translation under the title, *Soviet Physics—JETP*. Published and sold through subscription by the American Institute of Physics, with Foundation support, the journal received rapid acceptance. By the end of the fiscal year, the subscription list had grown to 700. During fiscal year 1957, it will bring to its subscribers some 2,600 pages of translated material at approximately the cost of an individual translation of 10 to 12 pages. Judging from the reception by physicists of *Soviet Physics—JETP*, and its decreasing cost to the taxpayer as its subscription list increases, carefully chosen journals in complete translation are an effective tool in the dissemination of foreign research information.

During the latter part of fiscal year 1956, the Foundation awarded a grant to *Biological Abstracts* for translating and publishing 1,200 abstracts from the Russian biological abstracting journal, *Referativnyi Zhurnal: Biologiia*. A selection from 31 primary Russian journals will be covered in an attempt to evaluate the effectiveness of translating abstracts while, at the same time, increasing the awareness of Russian biological science.

A grant to the American Mathematical Society was renewed to enable the society to continue its publication of 1,000 pages annually of translations of selected papers from a broad range of original Russian sources.

Because of the early success of the first journal translation project, a grant was awarded towards the end of fiscal year 1956 to enable the American Institute of Physics to begin publication of three additional Russian journals: The *Journal of Technical Physics*, the physics sections of the *Proceedings of the Academy of Sciences of the U. S. S. R. (Doklady)*, and the *Journal of Acoustics*. Since the physics section of the Bulletin of the Academy of Science of the U. S. S. R. and the Russian journal, *Atomic Energy*, are already being published commercially, it is felt that the current physics translation program is now covering the most essential journals. Possible further expansion of the program will await reactions of physicists to presently available journals.

Although an intensive translation program, typified by the projects described, is new in the United States, translation of separate articles, short books, and similar material has always been an important part of

the information research of scientists. In this context, the Foundation continued to support during fiscal year 1956 the work of the Russian Scientific Translation Center of the Library of Congress. The center now holds about 4,000 translations in many fields of science and technology, given or loaned to the Library. Their availability is announced through a monthly bibliography, 817 copies of which are widely distributed. Microfilm or photostat copies are sold by the Library at a moderate price. During fiscal year 1956, nearly 1,500 copies of translations were ordered from the center by scientists, libraries, students, and others.

Attendance of American Scientists at International Scientific Meetings

Personal contact between the leading scientists of the world stimulates thinking and promotes the exchange of scientific ideas and information, thereby accelerating scientific progress. To encourage such face-to-face contact, the Foundation provided, during fiscal year 1956, a limited number of grants for partial payment of travel expenses to enable American scientists to participate in selected international scientific meetings.

Keeping the Public Informed

Current, authoritative information about scientific programs of the United States Government must be available to all United States citizens to enable them to understand measures advocated by the Congress, scientists, educators, and industrialists aware of the implications of danger to the economy and defense of the United States resulting from lack of substantial American accomplishment in basic scientific research, need for well-qualified secondary-school teachers of science courses, shortages of scientists and educators in many fields, and the portentous advances of Soviet technology. This fact was pointed up sharply by President Eisenhower, in April 1956, when he established the National Committee for the Development of Scientists and Engineers. In his charge to the Committee, the President said: "It is my hope that the Committee will publicize the problem and possible solutions in order to stimulate public understanding and support." Public understanding of the economic and social significance of science in the United States is measurably improved as the great newspapers and magazines of the Nation give wider coverage to science in news and feature columns. During the past fiscal year the Foundation provided substantial services to an increasing number of science writers and editors employed by the press and magazines to help carry the science story to the public.

CONFERENCES IN SUPPORT OF SCIENCE

Support of conferences and symposia which bring together leading scientists is a key function of the National Science Foundation. These meetings provide a forum for the exchange of information and ideas among scientists who are pioneering in new or incompletely explored fields. They also furnish opportunity in many cases for younger scientists to learn and obtain advice from some of the world's outstanding senior scientists. Frequently the subject matter is of an interdisciplinary nature of interest to scientists in several fields.

The National Science Foundation sponsored and provided partial support for a total of 29 conferences in support of science during the year ending June 30, 1956—most often in cases where adequate support was not otherwise available. In all instances sponsorship was shared with one or more private or public agencies, including universities and scientific societies.

To insure wide distribution of conference subject matter, proceedings and papers are frequently published by the sponsors. Normally the request for support of conferences originates with scientists working in the field under review.

An idea of the wide range of subject matter covered by these 29 Foundation-supported conferences can be obtained from the brief descriptions which follow.

Scientific Conferences Sponsored and Supported by The National Science Foundation in Year Ending June 30, 1956

<i>Subject</i>	<i>Cosponsoring Organizations</i>	<i>Chairman</i>
Metabolic Aspects of Transport Across Cell Membranes.	University of Wisconsin.....	Q. R. Murphy.
Tissue Elasticity.....	Dartmouth College.....	John W. Remington.
↳ Nuclear Geophysics.....	National Academy of Sciences- National Research Council, Pennsylvania State University.	P. M. Hurley.
Recent Advances in Invertebrate Physiology.	University of Oregon.....	Bradley T. Scheer.
Microneurophysiology of the Synapse.	University of Washington.....	Theodore C. Ruch.
✓ Fourth National Clay Conference.	National Academy of Sciences..	T. F. Bates.

Scientific Conferences Sponsored and Supported by The National Science Foundation in Year
Ending June 30, 1956—Continued

<i>Subject</i>	<i>Cosponsoring Organizations</i>	<i>Chairman</i>
✓ World Symposium on Applied Solar Energy.	Association for Applied Solar Energy, University of Arizona, Stanford Research Institute.	F. E. Roy.
Systematics	Missouri Botanical Garden	Rolla M. Tryon, Jr.
✓ Problems of Research Administration in University Physics Departments.	Yale University	W. W. Watson.
Application of Mathematics to Engineering.	American Society for Engineering Education, California Institute of Technology, University of Michigan.	F. C. Lindvall; G. G. Brown, cochairman.
✓ Molecular Quantum Mechanics.	University of Texas	F. A. Matsen.
✓ Low Temperature Research.	Louisiana State University	J. G. Daunt.
✓ Theoretical Geophysics	Carnegie Institution of Washington.	J. von Neumann.
✓ Chemical Reactions in Urban Atmospheres.	Air Pollution Foundation, American Petroleum Institute.	L. H. Rogers.
✓ Fourth International Congress on Physical Optics.	American Academy of Arts and Sciences, Optical Society of America, National Academy of Sciences-National Research Council, International Union of Pure and Applied Physics.	S. S. Ballard.
✓ High Energy Nuclear Physics.	University of Rochester, Atomic Energy Commission, Air Research and Development Command.	R. E. Marshak.
✓ Cosmic Distance Scale	University of Virginia	H. L. Alden.
✓ Quantum Interaction of the Free Electron.	University of Maryland	L. Marton.
Recording Sounds Produced by Animals.	Pennsylvania State University . .	Hubert Frings.
✓ Science and the Modern World View.	American Academy of Arts and Sciences.	Ralph W. Burhoe.
Third National Pollen Conference.	American Geographical Society.	Calvin J. Heusser.
Evolution of Behavior	American Psychological Association, Society for the Study of Evolution.	Anne Roe.
Metabolism of Mucopolysaccharides.	Retina Foundation	Endre A. Balazs.
✓ Spectroscopy	Ohio State University, Office of Naval Research.	Harold H. Nielsen.
Quantitative Biology	Long Island Biological Association.	M. Demerec.
Developmental Biology Workshop.	National Academy of Sciences-National Research Council.	Paul Weiss.
✓ Earthquake Engineering . . .	Earthquake Engineering Research Institute, University of California.	George W. Housner.

Scientific Conferences Sponsored and Supported by The National Science Foundation in Year
Ending June 30, 1956—Continued

<i>Subject</i>	<i>Cosponsoring Organizations</i>	<i>Chairman</i>
✓ Second International Congress on Acoustics.	International Commission on Acoustics, the Acoustical Society of America, Office of Naval Research, Office of Scientific Research-Air Force, Department of the Army-Office of the Surgeon General.	R. H. Bolt.
✓ High Temperature.....	University of California, Stanford Research Institute, Office of Naval Research, Office of Scientific Research-Air Force, Office of Ordnance Research.	Leo Brewer, Nevin Hiester, Alan W. Searcy (joint chairmen).

Metabolic Aspects of Transport Across Cell Membranes

Because of the increasing interest in problem of transport across cell membranes, it was felt that a symposium dealing with the metabolic aspects of such transport would be of great value. The symposium, held during August 1955 at the University of Wisconsin, was attended by leading biochemists, cell physiologists, and physical chemists who helped to bring together the large mass of widely scattered data on isolated cells and tissues; it permitted an appraisal of the application of this data to the whole animal.

Tissue Elasticity

Many important physiological and medical problems are dependent for their solution on our understanding of the factors which control and alter the elastic behavior of living tissues—lungs, gastrointestinal tract, blood vessels, and muscles. To further this understanding, a conference was held at Dartmouth College in New Hampshire, during September 1955. Attending were 25 leading investigators from various fields who have experience in this area. Included were physiologists, high polymer physicochemists, protein chemists, and even physicists.

Nuclear Geophysics

The application of the approaches and techniques of nuclear physics to geological research has a vast potential as has already been demonstrated. Therefore this conference was convened to encourage further

the development of fields of study which could make use of these tools in attacking problems of both nuclear physics and geology. Subjects covered included: natural variations of isotope ratios; induced natural radioactivity and natural fission; nuclear constants of interest to geophysics; evaluation of methods of geologic age measurements; and elemental abundancies.

About 40 scientists attended this conference which was held during September 1955 at University Park, Pa.

Recent Advances in Invertebrate Physiology

About 50 leading investigators attended this conference which was held at the University of Oregon during September 1955. Topics discussed included: sensory and regulatory mechanisms; postural and effector systems; and maintenance systems. Also discussed were such subjects as the physiological basis of time measurement in organisms.

Microneurophysiology of the Synapse

One of the main problems in the field of neurophysiology is the mechanism whereby excitation travels from one cell to another via the synapse, the functional union or point of contact between neurons. Recent development of new techniques and instruments has opened new avenues of approach to the problem and permitted the collection of new data. This conference of leading investigators of these new and sometimes divergent developments in synaptic physiology was held in Seattle during October 1955 to accelerate progress in this important area of neurophysiology.

Clay

Prominent scientists from Spain, Belgium, Germany, Japan, Australia, England, and France attended the Fourth National Clay Conference which was held at the Pennsylvania State University during October 1955. They presented reports on their own research as well as on that of their colleagues in the countries they represented. Three of the sessions were in the form of symposia on Thermal Transformations, Clay-water Relationships, and Mixed-layer Clays; a total of 42 technical papers were presented during these sessions.

Applied Solar Energy

This World Symposium was held at the University of Arizona in Phoenix during November 1955. More than 1,000 scientists, engineers, educators, and industrialists from 36 nations heard 120 reports and papers. The sessions opened with a paper dealing with the problem of harnessing the sun's energy; closed with a round table discussion on the future of applied solar energy; and included papers and discussions dealing with the economics of solar energy, solar machinery, high-temperature furnaces, solar stills, the residential uses of solar energy, and photochemical processes for food production. The Proceedings have been published in a volume containing the complete text and illustrations of the papers presented. The Foundation supported the basic research portion of the symposium.

Systematics

This symposium was attended by approximately 70 scientists for a free exchange of opinions and ideas on the botanical and zoological problems which relate to taxonomy. It was held in St. Louis during November 1955 and was of special interest to taxonomists because of the manner in which their field of interest impinges upon such fields as morphology, genetics, cytology, and evolution. The meeting had the additional advantage of permitting the participation of young investigators and those researchers attending small midwestern colleges, thus stimulating their interest in pursuing further their careers as investigators.

Problems of Research Administration in University Physics Departments

Although many opportunities are available for university physicists to meet and discuss scientific subjects, there is little opportunity for administrators of physics as well as other science departments to discuss serious policy questions that confront the heads of such research departments.

This conference was held in New Haven during November 1955 and covered many of these administrative problems. Problems discussed included: the effect of modern team research on research training; more effective methods for identifying promising research men among graduate students; and more effective use of young Ph. D. research associates. It is expected that this conference will strengthen the teaching and research carried out in this country, especially in those newer departments that have sprung up since 1946.

Application of Mathematics to Engineering

Applied scientists and engineers can fully utilize the newly discovered phenomena of pure science only if they have an excellent knowledge of mathematical tools and theory. It was therefore considered desirable to bring together engineers, mathematicians, and physicists from both industry and the educational field for an interchange of ideas on the application of mathematics to the various engineering fields, for an assessment of the present and future mathematical requirements of engineering, and for a discussion of the present and future mathematical emphasis of both undergraduate and graduate curricula in engineering. This conference was held in two sessions. The first, at the California Institute of Technology during November 1955, and the second, at the University of Michigan during June 1956.

Molecular Quantum Mechanics

The December 1955 conference at the University of Texas brought to this country a group of foreign scientists who joined with American chemists and physicists in discussing recent advances in the quantum theory of molecules. The meeting was especially profitable in advancing the work on valence bonds and molecular energy states in which computing machines are used.

Low Temperature Research

Physicists, chemists, and engineers working on problems such as liquid helium, superconductivity, and specific heats near absolute zero, were brought together at this conference which was held in December 1955 at Louisiana State University. The conference enabled scientists who have developed new low temperature techniques to have a concentrated discussion on recent progress in the field.

Theoretical Geophysics

This conference was attended by about 60 scientists in Washington, D. C., during February 1956. Among the subjects discussed was that of determining the present needs in theoretical geophysics. Also discussed was the analysis of geophysical data which will result from activities during the International Geophysical Year and the possible creation of an Institute for Theoretical Geophysics.

Chemical Reactions in Urban Atmospheres

Held at the University of California in Los Angeles during February 1956, this conference was attended by about 30 chemists, physicists, and engineers, who reviewed the basic knowledge of photochemistry and the kinetics of gaseous reactions as it applies to the chemical aspects of smog formation and air pollution. The conference proceedings will be published.

Physical Optics

Significant review papers on subjects related to optical methods in nuclear physics, nuclear magnetic resonance, and polarization and meteorological optics were presented at the Fourth International Congress on Physical Optics. The conference, which was held at Massachusetts Institute of Technology from March 28 to April 3, 1956, brought together a large number of scientists from a number of countries to exchange ideas on advances in the field of optics.

High Energy Nuclear Physics

The Sixth Annual Conference on High Energy Nuclear Physics at the University of Rochester in New York State was enlarged this year both in the number of attendees and the duration of the meeting. Approximately 200 scientists attended and discussed recent advances in high energy physics for 5 days during April 1956. The Rochester conference this year, as before, was the outstanding conference on high energy nuclear physics in the world. Discussions centered around recent advances in theoretical and experimental physics with emphasis on the interaction of elementary particles. For the first time since the start of these conferences, three scientists from the U. S. S. R. were in attendance.

Cosmic Distance Scale

This conference, held at the University of Virginia in April 1956, brought together astronomers ranging from those who measure the distances of the nearest stars by geometrical means (i. e., triangulation) to those who determine more indirectly distances of remote galaxies. The latter depend on the former for their eventual calibration. The extraordinary pains that must be taken to avoid or to correct for systematic errors of the minute displacements that are measured in the geometric method were thoroughly discussed. The intermediate steps

between the small and the large distances were critically examined. The recent (August 1952) doubling of the scale of large distances was discussed, partly from the view of hindsight and partly from the standpoint of how to insure greater accuracy in the future.

Quantum Interaction of the Free Electron

This conference was held at College Park, Md., during April 1956 and was the first on this basic theme to be held in the United States. It brought together world leaders working on various phases of the problem of quantum interaction of free electrons. Subject matter discussed included: electron scattering, electron energy losses, positron interactions with matter, electron interference phenomena, and electron polarization effects. About 100 scientists attended.

Recording Sounds Produced by Animals

Printed words do not convey a true idea of animal sounds, much less of the cries of bats or underwater signals of fish or mammals. Therefore, there is a need for recordings which can be made available to interested scientists. This need led to the convening of a conference at University Park, Pa., during April 1956 for the purpose of laying the groundwork for international coordination of research work in auditory communication among animals. It initiated the development of standards for a reference library of animal sounds which could be used by investigators in the field of animal behavior.

The conference was attended not only by scientists in this field but also by industrial recording engineers who gave the benefit of their technical advice.

Science and the Modern World View

This conference was held in Boston during May 1956, and was concerned with the role of science in developing new perspectives of the universe and with the interrelations of the natural sciences, the social sciences, and the humanities. The three major questions discussed were: (1) In what manner did Newtonian science influence our picture of the world? (2) Has modern science changed the basic concepts on which our present world view was built? (3) What are possible steps toward a new synthesis of science and the humanities in a common understanding? Invited participants represented many schools of thought.

Pollen

Some 40 scientists, including geologists, botanists, and zoologists, interested in pollen and other microfossils as environmental indicators during past ages, attended this Third National Pollen Conference at Oberlin College, Oberlin, Ohio, held during May 1956. The program covered the Pleistocene and pre-Pleistocene deposits in the East and Midwest, the Southwest, and the Northwest-Arctic. A conference of this type enabled workers interested in this comparatively new area of science to keep up to date with the latest developments.

Evolution of Behavior

Mutual interest of psychologists, biologists, and other biological scientists in evolutionary principles as they relate to the development of behavior at different levels of complexity led to the convening of two conferences. This conference, the second held on this subject, was concerned mainly with the production of an integrated symposium volume to make the latest developments in this field generally available. The program covered such items as: methods and present status of theory in studies of evolution and behavior; machinery of behavior (morphology, neurophysiology, endocrinology, etc.); genetical and developmental basis of behavior; categories of behavior (locomotion, migration, reproduction, social behavior, etc.); place of behavior in the study of evolution; motivation and cognitive behavior; and the relation between biological and cultural evolution. The first conference held a year earlier was concerned with much the same subject matter, but was concerned largely with interdisciplinary orientation and the blocking out of information then available. This conference was held during May 1956 in University Park, Pa.

Metabolism of Mucopolysaccharides

Investigation of the biochemistry, physiology, and medical implications of the mucopolysaccharides has been a very active field of research in recent years. These substances are known to be important constituents of connective tissue, one of the most widely dispersed body tissues and yet, in the physiological sense, one of the least understood. The mucopolysaccharides appear to play a very important role in the normal physiology of the ground substance and of the fibrillar components of the connective tissue. The metabolism of these compounds also seems to be involved in certain pathological conditions such as arthritis.

The objective of this conference was therefore to bring together about 12 leaders in this field and an additional 30 persons representing pertinent impinging disciplines to discuss recent advances in this area. The meeting resulted in a clarification of concepts of the metabolic and physiological role of the mucopolysaccharides and will prove of great value in providing impetus for future experimentation. The conference was held during June 1956 in Boston.

Spectroscopy

Foundation support of this conference enabled the spectroscopists at Ohio State University to hold a larger conference on spectroscopy than they had been able to hold in previous years. The meeting, in June 1956, was international in character as it was held jointly with the International Commission on Spectroscopy. Participants, almost equally divided between chemists and physicists, discussed recent advances in atomic and molecular spectra based on optical and microwave techniques.

Quantitative Biology

The 21st Coldspring Harbor Symposium on Quantitative Biology was held in Long Island, N. Y., during June 1956 and was devoted to a synthesis of present knowledge in various related areas of research that impinge upon the control of development. It provided opportunity for geneticists and experimental embryologists to obtain a new and broader perspective by interchange of information. Topics included: composition and mode of action of the gene at the chemical level; the role of the nucleus in differentiation; modern advances in experimental embryology interpreted, insofar as possible, in terms of the genetical control of development; and the complex problem of interactions.

Developmental Biology Workshop

The workshop presented an opportunity for persons in the formative stages of their careers (30 younger scientists and graduate students) to come in contact with 20 outstanding senior scientists. The 2-week conference stressed interdisciplinary study in basic bacteriological problems in such fields as experimental embryology, biochemistry, plant physiology, endocrinology, and genetics. The workshop atmosphere was maintained through the use of illustrative examples, elaborate

exhibits, and visual aids. The meeting was held at the Jackson Memorial Laboratory, Bar Harbor, Maine, during June 1956.

Earthquake Engineering

The purpose of this world conference was to gather the latest information on research and development pertaining to destructive earthquakes and how to minimize the damage caused by such earthquakes. It was held at the University of California during June 1956. Papers presented at the conference should not only increase our knowledge of earthquakes but also assist in the development of blast-resistant construction. Such construction will be of value in protecting structures against atomic blasts as well as against earthquakes. Participants included scientists and engineers from nine foreign countries in addition to Americans.

Acoustics

The Second International Congress on Acoustics was held at the Massachusetts Institute of Technology during June 1956. The program was arranged around the following subjects: human responses to sound; physics of sound; architectural and musical acoustics; noise control; and uses of sound in science and engineering. These international congresses are held every 3 years and foster international collaboration in pure and applied acoustics, a rapidly developing field that springs from both the physical and life sciences and contributes to many branches of engineering.

High Temperature

Interest in high temperature research results from the use of high temperatures in the production of new materials as well as the problems brought about by the thermal heating of supersonic aircraft and missiles and the thermal effects of high energy explosions. In the materials field, the production of new chemicals and the preparation of refractory alloys and ceramic bodies is of considerable importance.

This symposium represented the culmination of the efforts of the NSF ad hoc Advisory Panel for High Temperature Research and other individuals during the past few years. It was held at the University of California during June 1956. Topics discussed were: the relationship of structure to properties of high temperature materials; the interaction of high temperature materials with environments—equilibrium considerations; and the interaction of high temperature materials with their environments—kinetic considerations.

Appendices

APPENDIX A

National Science Board, Staff, Committees, Commissions, and Advisory Panels

NATIONAL SCIENCE BOARD

Terms expire May 10, 1958

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 EDWARD L. TATUM, Professor of Biology, Stanford University, Palo Alto, Calif.

* * * * *

ALAN T. WATERMAN (ex officio), Director, National Science Foundation, Washington, D. C.

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- MARSTON BATES, Vice Chancellor, University of Puerto Rico, Rio Piedras, P. R.
- LUTHER S. CRESSMAN, Head, Department of Anthropology, University of Oregon, Eugene, Oreg.
- LEON FESTINGER, Department of Psychology, Stanford University, Stanford, Calif.
- WILLIAM W. HOWELLS, Department of Anthropology, Harvard University, Cambridge, Mass.
- CLYDE KLUCKHOHN, Department of Social Relations, Harvard University, Cambridge, Mass.
- RUPERT B. VANCE, Kenan Professor of Sociology, University of North Carolina, Chapel Hill, N. C.
- SHERWOOD WASHBURN, Department of Anthropology, University of Chicago, Chicago, Ill.

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- HORACE W. BABCOCK, Mount Wilson and Palomar Observatories, Pasadena, Calif.
- GERALD M. CLEMENCE, Director, Nautical Almanac, U. S. Naval Observatory, Washington, D. C.
- PAUL HERGET, Director, Cincinnati Observatory, Cincinnati, Ohio.
- GEOFFREY KELLER, Director, Perkins Observatory, Delaware, Ohio.
- NICHOLAS U. MAYALL, Lick Observatory, Mount Hamilton, Calif.
- W. W. MORGAN, Yerkes Observatory, University of Chicago, Williams Bay, Wis.
- LYMAN SPITZER, Jr., Director, Princeton Observatory, Princeton University, Princeton, N. J.
- KAJ AA. STRAND, Director, Dearborn Observatory, Northwestern University, Evanston, Ill.
- ALBERT E. WHITFORD, Director, Washburn Observatory, University of Wisconsin, Madison, Wis.

Advisory Panel for Chemistry

- PAUL D. BARTLETT, Department of Chemistry, Harvard University, Cambridge, Mass.
- PAUL C. CROSS, Department of Chemistry, University of Washington, Seattle, Wash.
- WILLIAM S. JOHNSON, Department of Chemistry, University of Wisconsin, Madison, Wis.
- JOHN G. KIRKWOOD, Department of Chemistry, Yale University, New Haven, Conn.

HARRY F. LEWIS, Vice President, Institute of Paper Chemistry, Appleton, Wis.

FREDERICK A. MATSEN, Department of Chemistry, University of Texas, Austin, Tex.

HERMANN I. SCHLESINGER, Department of Chemistry, University of Chicago, Chicago, Ill.

ERNEST H. SWIFT, Department of Chemistry, California Institute of Technology, Pasadena, Calif.

WILLIAM G. YOUNG, Dean, Division of Physical Sciences, University of California, Los Angeles, Calif.

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CHARLES H. BEHRE, Jr., Department of Geology, Columbia University, New York, N. Y.

HUGO BENIOFF, Division of Geological Sciences, California Institute of Technology, Pasadena, Calif.

M. KING HUBBERT, Chief Research Consultant, Shell Oil Co., Houston, Tex.

WALTER H. MUNK, Scripps Institution of Oceanography, La Jolla, Calif.

WILLIAM T. PECORA, United States Geological Survey, Washington, D. C.

SVERRE PETTERSEN, Department of Meteorology, University of Chicago, Chicago, Ill.

RICHARD J. RUSSELL, Dean of Graduate School, Louisiana State University, Baton Rouge, La.

PHILIP J. SHENON, 1339 Third Avenue, Salt Lake City, Utah.

HAROLD C. UREY, Institute for Nuclear Studies, University of Chicago, Chicago, Ill.

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RALPH E. FADUM, Head, Department of Civil Engineering, North Carolina State College, Raleigh, N. C.

GEORGE W. GLEESON, Dean, School of Engineering, Oregon State College, Corvallis, Oreg.

JOHN H. HOLLOWAY, Manager, Metal Research Department, General Electric Company, Schenectady, N. Y.

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ABEL WOLMAN, Department of Sanitary Engineering, Johns Hopkins University, Baltimore, Md.

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W. D. BILLINGS, Department of Botany, Duke University, Durham, N. C.
MURRAY F. BUELL, Department of Botany, Rutgers University, New Brunswick, N. J.

GEORGE L. CLARKE, Biological Laboratories, Harvard University, Cambridge, Mass.

W. J. HAMILTON, Jr., Department of Conservation, Cornell University, Ithaca, N. Y.

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ROBERT E. HUNGATE, Department of Bacteriology and Public Health, Washington State College, Pullman, Wash.

THOMAS PARK, Department of Zoology, University of Chicago, Chicago, Ill.

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HERSCHEL MITCHELL, Biology Division, California Institute of Technology, Pasadena, Calif.

G. LEDYARD STEBBINS, Division of Genetics, University of California, Davis, Calif.

RALPH H. WETMORE, Director, The Biological Laboratories, Harvard University, Cambridge, Mass.

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- PHILIPP G. FRANK, American Academy of Arts and Sciences, Cambridge, Mass.
- JOHN F. FULTON, Yale University School of Medicine, New Haven, Conn.
- ROBERT B. LINDSAY, Department of Physics, Brown University, Providence, R. I.
- RICHARD H. SHRYOCK, Institute for the History of Medicine, Johns Hopkins University, Baltimore, Md.
- JOSEPH J. SPENGLER, Department of Economics, Duke University, Durham, N. C.

Advisory Panel for Mathematical Sciences

- DAVID H. BLACKWELL, Department of Mathematics, University of California, Berkeley, Calif.
- RALPH P. BOAS, Department of Mathematics, Northwestern University, Evanston, Ill.
- HENRI F. BOHNENBLUST, California Institute of Technology, Pasadena, Calif.
- RICHARD D. BRAUER, Department of Mathematics, Harvard University, Cambridge, Mass.
- WILLIAM S. MASSEY, Department of Mathematics, Brown University, Providence, R. I.
- EDWARD J. MCSHANE, Department of Mathematics, University of Virginia, Charlottesville, Va.
- MINA REES, Dean of Faculty, Hunter College, New York, N. Y.
- PAUL C. ROSENBLOOM, Department of Mathematics, University of Minnesota, Minneapolis, Minn.
- HASSLER WHITNEY, Department of Mathematics, Institute for Advanced Study, Princeton, N. J.

Advisory Panel for Molecular Biology

- ALLAN H. BROWN, Department of Botany, University of Minnesota, Minneapolis, Minn.
- M. DELBRÜCK, Division of Biology, California Institute of Technology, Pasadena, Calif.
- JOHN T. EDSALL, Biological Laboratories, Harvard University, Cambridge, Mass.
- RALPH O. ERICKSON, Botany Department, University of Pennsylvania, Philadelphia, Pa.
- FRANK H. JOHNSON, Department of Biology, Princeton University, Princeton, N. J.

HENRY A. LARDY, Chairman, Research Department, Enzyme Institute, University of Wisconsin, Madison, Wis.

HOWARD K. SCHACHMAN, Virus Laboratory, University of California, Berkeley, Calif.

DAVID SHEMIN, Department of Biochemistry, College of Physicians and Surgeons, Columbia University, New York, N. Y.

BIRGIT VENNESLAND, Department of Biochemistry, University of Chicago, Chicago, Ill.

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ROBERT B. BRODE, Department of Physics, University of California, Berkeley, Calif.

DAVID M. DENNISON, Chairman, Department of Physics, University of Michigan, Ann Arbor, Mich.

GAYLORD P. HARNWELL, President, University of Pennsylvania, Philadelphia, Pa.

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CECIL T. LANE, Department of Physics, Yale University, New Haven, Conn.

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JOHN C. SLATER, Department of Physics, Massachusetts Institute of Technology, Cambridge, Mass.

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FRANK A. BEACH, Department of Psychology, Yale University, New Haven, Conn.

CARL I. HOVLAND, Department of Psychology, Yale University, New Haven, Conn.

LYLE H. LANIER, Department of Psychology, University of Illinois, Urbana, Ill.

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W. D. NEFF, Department of Psychology, University of Chicago, Chicago, Ill.

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Advisory Panel for Regulatory Biology

- R. H. BURRIS, Department of Biochemistry, University of Wisconsin, Madison, Wis.
- ARTHUR W. GALSTON, Osborn Botanical Laboratory, Yale University, New Haven, Conn.
- I. C. GUNSALUS, Department of Bacteriology, University of Illinois, Urbana, Ill.
- WILLIAM D. McELROY, Director, McCollum-Pratt Institute, Johns Hopkins University, Baltimore, Md.
- A. M. PAPPENHEIMER, Jr., Department of Microbiology, New York University College of Medicine, New York, N. Y.
- SIDNEY ROBERTS, Department of Physiological Chemistry, University of California, Los Angeles, Calif.
- ELMER STOTZ, School of Medicine and Dentistry, University of Rochester School of Medicine, Rochester, N. Y.
- E. L. TATUM, Department of Biological Sciences, Stanford University, Palo Alto, Calif.
- ALFRED E. WILHELMI, Department of Biochemistry, Emory University College of Medicine, Atlanta, Ga.

Advisory Panel on Scientific Manpower Information

- JAMES W. COLE, Jr., School of Chemistry, University of Virginia, Charlottesville, Va.
- HAROLD GOLDSTEIN, Assistant Chief, Division of Manpower and Employment Statistics, Bureau of Labor Statistics, United States Department of Labor, Washington, D. C.
- ALBERT KAY, Director, Office of Manpower Supply, Department of Defense, Washington, D. C.
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- RAY W. MAYHEW, Owens-Illinois Glass Co., Toledo, Ohio.
- JAMES C. O'BRIEN, Director of Personnel, Department of Health, Education, and Welfare, Washington, D. C.
- PHILIP N. POWERS, Internuclear Co., Clayton, Mo.
- M. H. TRYTTEN, Director, Office of Scientific Personnel, National Academy of Sciences-National Research Council, Washington, D. C.
- J. FLETCHER WELLEMAYER, Staff Advisor on Personnel Studies, American Council of Learned Societies, Washington, D. C.
- DAEL WOLFLE, Executive Officer, American Association for the Advancement of Science, Washington, D. C.

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- CLARK KERR, Chancellor, University of California, Berkeley, Calif.
 CLYDE KLUCKHOHN, Department of Social Relations, Harvard University, Cambridge, Mass.
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 LIBBIE H. HYMAN, American Museum of Natural History, New York, N. Y.
 DAVID D. KECK, Head Curator, New York Botanical Garden, New York, N. Y.
 REMINGTON KELLOGG, Director, United States National Museum, Washington, D. C.
 KARL P. SCHMIDT, Emeritus Curator, Chicago Natural History Museum, Chicago, Ill.
 A. C. SMITH, Curator, United States National Museum, Washington, D. C.
 WILLIAM C. STEERE, Dean, Graduate School, Stanford University, Stanford, Calif.
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- JOSEPH O. HIRSCHFELDER, Department of Chemistry, University of Wisconsin, Madison, Wis.
- RALPH E. MEAGHER, Department of Physics, University of Illinois, Urbana, Ill.
- PHILIP M. MORSE, Department of Physics, Massachusetts Institute of Technology, Cambridge, Mass.
- WALTER H. MUNK, Scripps Institution of Oceanography, La Jolla, Calif.
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- MARTIN SCHWARZSCHILD, Department of Astronomy, Princeton University, Princeton, N. J.
- EDWARD TELLER, Department of Physics, University of California, Livermore, Calif.
- S. M. ULAM, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
- JOHN VON NEUMANN, Commissioner, Atomic Energy Commission, Washington, D. C.

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- CHAUNCEY STARR, North American Aviation, Inc., Los Angeles, Calif.
- EUGENE P. WIGNER, Department of Physics, Princeton University, Princeton, N. J.
- RAYMOND E. ZIRKLE, Chairman, Committee on Biophysics, University of Chicago, Chicago, Ill.

APPENDIX B

Research Support Program

BASIC RESEARCH GRANTS AWARDED IN FISCAL YEAR 1956

Anthropological and Related Sciences

- BERNICE P. BISHOP MUSEUM, Honolulu, T. H.; Charles E. Snow; *Prehistoric Inhabitants of Oahu*; 2 years; \$7,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Robert J. Braidwood, The Oriental Institute; *Synthesis of Certain Aspects of the Transition from Food-Gathering to Food-Production*; 2 years; \$6,300.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Sol Tax, Department of Anthropology; *Interrelations of Vegetation, Agricultural Patterns, and Human Culture in Mexico*; 2 years; \$15,800.
- CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Donald Collier, South American Archaeology and Ethnology; *Archaeological Study of Urbanization in Prehistoric Peru*; 2 years; \$8,500.
- HARVARD UNIVERSITY, Cambridge, Mass.; Fred H. Allen, Jr., Harvard Medical School; *Blood Typing of Native Population at Hacienda Vicos, Peru*; 1 year; \$2,800.
- HARVARD UNIVERSITY, Cambridge, Mass.; Hallam L. Movius, Jr., Peabody Museum; *Upper Paleolithic Studies in the Dordogne Region*; 2 years; \$27,200.
- HARVARD UNIVERSITY, Cambridge, Mass.; Douglas L. Oliver, Department of Anthropology; *Anthropological Study of the Society Islands*; 2 years; \$11,900.
- INDIANA UNIVERSITY, Bloomington, Ind.; Sol Saporta, Research Center in Anthropology; *General Laws Regarding the Sequences of Phonemes*; 2 years; \$11,700.
- STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; William A. Ritchie, New York State Museum and Science Service; *Development of Aboriginal Settlement Patterns in the Northeast*; 3 years; \$8,800.
- UNIVERSITY OF OREGON, Eugene, Oreg.; Walter T. Martin, Department of Sociology; *A Unifying Empirical Principle in the Analysis of Variations in Selected Mortality Rates*; 2 years; \$7,000.
- UNIVERSITY OF OREGON, Eugene, Oreg.; Lois W. Mednick, Department of Anthropology; *Morphology and Growth Patterns of Tupaia*; 1 year; \$4,000.
- SMITHSONIAN INSTITUTION, Washington, D. C.; Marshall T. Newman, Division of Physical Anthropology; *Physical Changes in the Indian Population of Hacienda Vicos*; 5 years; \$5,600.
- STANFORD UNIVERSITY, Stanford, Calif.; Leon Festinger, Department of Psychology; *Implications of the Theory of Cognitive Dissonance*; 2 years; \$16,500.

Astronomy

- AMHERST COLLEGE, Amherst, Mass.; Albert P. Linnell, Department of Astronomy; *Eclipsing Binary Stars*; 2 years; \$2,000.
- ASSOCIATED UNIVERSITIES, INC., New York, N. Y.; Richard M. Emberson; *Program for the Establishment of a National Radio Astronomy Facility*; 1 year; \$140,500.
- BRIGHAM YOUNG UNIVERSITY, Provo, Utah; D. H. McNamara, Department of Physics; *Spectrographic Study of Peculiar Eclipsing Binaries*; 2 years; \$5,800.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; George H. Herbig, Lick Observatory, Mount Hamilton, Calif.; *Spectroscopic Studies of T Tauri Stars*; 1 year; \$5,500.

- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Merle Walker, Department of Astronomy; *Color-Magnitude Diagrams of Extremely Young Clusters of Stars*; 6 months; \$3,700.
- CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; J. J. Nassau, Warner and Swasey Observatory; *Relocation of the Schmidt Telescope of the Warner and Swasey Observatory*; \$20,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; G. Van Biebroeck, Department of Astronomy; *Astrometric Investigations*; 1 year; \$4,600.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; A. Blaauw, Department of Astronomy; *Spectroscopic Binaries in the Nearest O-Associations*; 2 years; \$12,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; G. P. Kuiper, Department of Astronomy; *Physical and Statistical Studies of Asteroids*; 1 year; \$16,700.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Bengt Stromgren and Robert H. Weitbrecht, Department of Astronomy; *Simultaneous Three-Color Photometry of Faint O-B Stars*; 2 years; \$4,100.
- FORDHAM UNIVERSITY, New York, N. Y.; Walter J. Miller, Astronomical Laboratory; *Faint Variable Stars in the Cygnus Cloud*; 2 years; \$9,000.
- HARVARD UNIVERSITY, Cambridge, Mass.; Bart J. Bok, Harvard College Observatory; *Radio Astronomy in the Microwave Region*; 1 year; \$24,200.
- HARVARD UNIVERSITY, Cambridge, Mass.; Sergei Gaposchkin, Department of Astronomy; *Southern Variable Stars*; 1 year; \$4,900.
- HAVERFORD COLLEGE, Haverford, Pa.; Louis C. Green, Department of Astronomy; *High Accuracy Atomic Wave Functions*; 1 year; \$6,200.
- INDIANA UNIVERSITY, Bloomington, Ind.; Frank K. Edmondson, Department of Astronomy; *Observations of Asteroids on International Astronomical Union Critical List*; 1 year; \$5,300.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Hugh M. Johnson, Department of Mathematics and Astronomy; *Photoelectric Photometry of Galactic Nebulas*; 1 year; \$3,700.
- LOWELL OBSERVATORY, Flagstaff, Ariz.; Henry L. Giclas, Astronomer; *Proper Motion Survey of the Northern Hemisphere*; 1 year; \$7,700.
- LOWELL OBSERVATORY, Flagstaff, Ariz.; E. C. Slipher and A. G. Wilson, Mars Committee; *Photographic Patrol of Mars*; 1 year; \$3,000.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Leo Goldberg, Department of Astronomy and Robert R. McMath, Director, McMath-Hulbert Observatory; *Studies Leading to the Establishment of an American Astronomical Observatory*; 9 months; \$250,000.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Morris S. Davis, Department of Physics; *Satellite Orbits and Mass of Saturn*; 1 year; \$8,600.
- OHIO STATE UNIVERSITY, Columbus, Ohio; John D. Kraus, Department of Electrical Engineering; *Construction of a Standing Paraboloid, Tilttable Flat-Sheet Reflector Radio Telescope Antenna*; 1 year; \$48,000.
- UNIVERSITY OF OKLAHOMA, Norman, Okla.; Balfour S. Whitney, Department of Mathematics and Astronomy; *Periods of Eclipsing Binary Stars*; 2 years; \$9,900.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Frank Bradshaw Wood, Department of Astronomy; *Partial Support of Construction of New Astronomical Observatory*; 1 year; \$10,000.
- UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; N. E. Wagman, Director, Allegheny Observatory; *Spectroscopic Binaries*; 1 year; \$2,000.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Theodore Dunham, Jr., Institute of Optics; *Photoelectric Recording of Absorption Line Profiles*; 1 year; \$3,200.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; M. P. Savedoff, Department of Physics; *Atmospheres of RR Lyrae and Delta Cephei*; 2 years; \$12,000.

- VANDERBILT UNIVERSITY, Nashville, Tenn.; Carl K. Seyfert, Department of Physics and Astronomy; *Distribution of Emission B-Type Stars*; 3 years; \$12,000.
- YALE UNIVERSITY, New Haven, Conn.; Dirk Brouwer, Department of Astronomy; *Systems of Fundamental Catalogs from Observations of Selected Minor Planets*; 2 years; \$11,500.

Chemistry

- UNIVERSITY OF ARIZONA, Tucson, Ariz.; Leslie S. Forster, Department of Chemistry; *Luminescence and Photochemistry of Diketones*; 2 years; \$5,100.
- UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; T. C. Hoering, Department of Chemistry; *Oxygen Exchange Kinetics: Oxy-Anions and Water*; 2 years; \$11,000.
- BROWN UNIVERSITY, Providence, R. I.; John Ross, Department of Chemistry; *Absolute Viscosity of Molecular Gases*; 2 years; \$12,500.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Norman Davidson, Department of Chemistry; *Free Radicals in Rigid Media*; 2 years; \$18,000.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; John D. Roberts, Department of Chemistry; *Chemistry of Small Ring Compounds*; 2 years; \$13,800.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Ernest H. Swift, Department of Chemistry; *Precipitation of Metal Sulfides by Thioacetamide*; 2 years; \$15,200.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Donald J. Cram, Department of Chemistry; *Transannular Effects in Large Ring Compounds*; 2 years; \$12,400.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; W. F. Giauque, Department of Chemistry; *Thermodynamic and Magnetic Properties of Chemical Substances Particularly at Low Temperatures*; 1 year; \$52,600.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Joel H. Hildebrand, Department of Chemistry; *Properties and Solubility Relations of Nonelectrolytes*; 2 years; \$14,200.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; James D. McCullough, Department of Chemistry, Los Angeles, Calif.; *Structural and Equilibrium Studies on Group VIIb Compounds*; 2 years; \$14,600.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Donald S. Noyce, Department of Chemistry; *Cyclic Systems and New Types of Transannular Interaction*; 2 years; \$14,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; R. L. Pecsok and P. S. Farrington, Department of Chemistry, Los Angeles, Calif.; *Chromatographic Analysis of Gaseous Mixtures for Trace Components*; 2 years; \$20,900.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; James N. Pitts, Jr., Department of Chemistry, Riverside, Calif.; *Structure and Photochemical Reactivity of Ketones*; 3 years; \$14,300.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Saul Winstein, Department of Chemistry, Los Angeles, Calif.; *Nature and Behaviour of Ion Pairs in Solvolysis*; 3 years; \$39,000.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert B. Carlin, Department of Chemistry; *Fischer Indole Synthesis*; 2 years, \$12,600.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Frederick D. Rossini, Department of Chemistry; *Thermochemistry of Hydrocarbons and Related Compounds*; 2 years; \$18,000.
- CENTRAL STATE COLLEGE, Wilberforce, Ohio; E. O. Woolfolk, Department of Chemistry; *Identification and Chromatographic Separation of Colorless Organic Compounds*; 2 years; \$5,200.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Thomas S. Lee, Department of Chemistry; *Electrochemical Behavior of Metal Ions at Extreme Dilution*; 2 years; \$8,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Harold C. Urey, Institute for Nuclear Studies; *Isotopic Abundances and Geochemical Phenomena*; 2 years; \$32,300.

- UNIVERSITY OF COLORADO, Boulder, Colo.; R. N. Keller, Department of Chemistry; *Radiocarbon Dating*; 1 year; \$7,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; Gilbert Stork, Department of Chemistry; *Stereospecific Syntheses of Natural Products*; 3 years; \$19,500.
- UNIVERSITY OF CONNECTICUT, Storrs, Conn.; Emil J. Slowinski, Jr., Department of Chemistry; *Temperature Effects in Molecular Vibrational Spectra*; 2 years; \$18,500.
- CORNELL UNIVERSITY, Ithaca, N. Y.; James L. Hoard, Department of Chemistry; *X-Ray Structural Analysis of Iron Group Chelate Complexes*; 2 years; \$15,400.
- CORNELL UNIVERSITY, Ithaca, N. Y.; William T. Miller, Jr., Department of Chemistry; *S-2' Substitution Reactions of Fluoro Olefins*; 2 years; \$13,000.
- DUKE UNIVERSITY, Durham, N. C.; Charles K. Bradsher, Department of Chemistry; *Benzoquinolizinium Salts*; 2 years; \$12,800.
- FORDHAM UNIVERSITY, New York, N. Y.; Charles F. Ferraro and Tibor S. Laszlo, Department of Chemistry; *Development and Construction of a Solar Furnace for High Temperature Research*; 1 year; \$14,000.
- HOWARD UNIVERSITY, Washington, D. C.; J. Leon Shereshefsky, Department of Chemistry; *Capillary Properties of Liquids in Micro-Systems*; 2 years; \$15,000.
- HARVARD UNIVERSITY, Cambridge, Mass.; Frederick C. Uhle, Department of Pharmacology; *Chemistry of the Ergot Alkaloids*; 1 year; \$9,300.
- HARVARD UNIVERSITY, Cambridge, Mass.; R. B. Woodward, Department of Chemistry; *Synthesis and Transformations of Triterpenes*; 3 years; \$42,600.
- HOFSTRA COLLEGE, Hempstead, N. Y.; Aaron Wold, Department of Chemistry; *Ternary Compounds of the Rare Earths*; 2 years; \$7,200.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; H. A. Laitinen, Department of Chemistry; *Adsorption Processes at Electrode Surfaces*; 2 years; \$11,800.
- INDIANA UNIVERSITY, Bloomington, Ind.; Harrison Shull, Department of Chemistry; *Theory of Atomic and Molecular Structure*; 2 years; \$17,000.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Norman C. Baenziger, Department of Chemistry; *Structures of Intermetallic Compounds*; 2 years; \$11,000.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Stanley Wawzonek, Department of Chemistry; *Preparation and Properties of Aminimides*; 2 years; \$13,300.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; J. D. H. Donnay, Department of Chemistry; *Crystal Structure of Nickel Etioporphyrin II*; 1 year; \$4,400.
- UNIVERSITY OF LOUISVILLE, Louisville, Ky.; Richard H. Wiley, Department of Chemistry; *Pyrimidines*; 3 years; \$16,000.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Richard C. Lord, Department of Chemistry; *Rotation-Vibration Spectra and Molecular Structure*; 3 years; \$27,500.
- UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Louis A. Carpino, Department of Chemistry; *Synthesis and Reactivity of Mono-Substituted Diimides*; 2 years; \$10,300.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; William E. Parham, Department of Chemistry; *A New Synthesis of Aromatic Compounds. A New Type of Quinone*; 2 years; \$11,600.
- MISSISSIPPI STATE COLLEGE, State College, Miss.; Lyell C. Behr, Department of Chemistry; *Position Isomerism in the Azoxybenzenes*; 6 months; \$2,100.
- MONMOUTH COLLEGE, Monmouth, Ill.; G. W. Thiessen, Department of Chemistry; *Benzenoid Inhibition in the Kolbe Electrolysis*; 2 years; \$12,500.
- MONTANA STATE COLLEGE, Bozeman, Mont.; Charles N. Caughlan, Department of Chemistry; *Organic Compounds of Titanium*; 2 years; \$9,900.
- MORGAN STATE COLLEGE, Baltimore, Md.; Clyde R. Dillard, Department of Chemistry; *Kinetics of Thermal Decomposition of Stannane and Homologous Compounds*; 2 years; \$13,200.

- MUNDELEIN COLLEGE FOR WOMEN, Chicago, Ill.; Sister Mary Martinette, Department of Chemistry; *Stereochemistry of Complex Inorganic Compounds*; 2 years; \$1,200.
- UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; Ben Millard, Department of Chemistry; *Differential Capacity of Gold Electrodes*; 2 years; \$6,600.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; J. F. Bunnett, Department of Chemistry; *Ether Cleavage in Aromatic Substitution Reactions*; 2 years; \$14,000.
- UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Roland G. Severson, Department of Chemistry; *Unsaturated Silicon Heterocycles*; 2 years; \$7,400.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; R. L. Burwell, Jr., and A. S. Hussey, Department of Chemistry; *Summer Research for College Chemistry Teachers*; 3 months; \$3,400.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; Robert L. Letsinger, Department of Chemistry; *New Types of Organoboron Compounds*; 2 years; \$12,000.
- OCCIDENTAL COLLEGE, Los Angeles, Calif.; Frank L. Lambert, Department of Chemistry; *Preparation of Organic Halides Using Inorganic and Organic Hypohalites*; 1 year; \$4,800.
- OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; George Gorin, Department of Chemistry; *Oxygen Reduction by Cysteine-Metal Complexes*; 2 years; \$11,000.
- OREGON STATE COLLEGE, Corvallis, Oreg.; Allen B. Scott, Department of Chemistry; *Impurities in Ionic Solids*; 2 years; \$17,300.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; B. P. Block, Department of Chemistry; *Steric Nature of Unusual Inorganic Compounds*; 3 years; \$13,500.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Norman C. Deno, Department of Chemistry; *Arylcarbonium Ion Equilibria and Application to Inorganic Chemistry*; 2 years; \$5,300.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Charles C. Price, Department of Chemistry; *Influence of Structure on Reactivity*; 2 years; \$14,900.
- POMONA COLLEGE, Claremont, Calif.; C. Freeman Allen, Department of Chemistry; *Degradative Structure Determination of C_{22} -Phthienoic Acid*; 2 years; \$8,600.
- PRINCIPIA COLLEGE, Elmhurst, Ill.; Ernest H. Lyons, Jr., Department of Chemistry; *Reaction Kinetics at Electrodes*; 2 years; \$4,800.
- UNIVERSITY OF REDLANDS, Redlands, Calif.; Reinhold J. Krantz and Harold W. Woodrow, Department of Chemistry; *Physical Properties and Chemical Structure of the Tertiary Nonyl Alcohols*; 2 years; \$8,300.
- RESEARCH FOUNDATION OF THE STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Max Metlay, Department of Chemistry and Robert H. Penfield, Department of Physics, Harpur College, Endicott, N. Y.; *Electron Affinities with a Radio Frequency Mass Spectrometer*; 2 years; \$12,000.
- RICE INSTITUTE, Houston, Tex.; Edward S. Lewis, Department of Chemistry; *Hydrogen Isotope Effects in Ionic Organic Reactions*; 1 year; \$7,100.
- RICE INSTITUTE, Houston, Tex.; Richard B. Turner, Department of Chemistry; *Heats of Catalytic Hydrogenation in Solution*; 3 years; \$19,000.
- COLLEGE OF ST. THOMAS, St. Paul, Minn.; William D. Larson, Department of Chemistry; *Thermodynamics of Acetic Acid Solutions*; 1 year; \$2,200.
- UNIVERSITY OF SOUTH CAROLINA, Columbia S. C.; DeLos F. DeTar, Department of Chemistry; *Free Radical Intermediates in Diazonium Salt Reactions*; 2 years; \$18,400.
- UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Jerome A. Berson, Department of Chemistry; *Conversion of Carbon Asymmetry into Molecular Asymmetry*; 2 years; \$16,300.

- UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Jerry Donohue, Department of Chemistry; *X-Ray Crystallographic Studies of Unusual Inorganic Compounds*; 3 years; \$28,000.
- STANFORD UNIVERSITY, Stanford, Calif.; Carl R. Noller, Department of Chemistry; *Isolation and Constitution of Saponins and Bitter Principle in Echinocystis Fabacea Roots*; 2 years; \$11,000.
- STANFORD UNIVERSITY, Stanford, Calif.; Richard A. Ogg, Jr., Department of Chemistry; *Nuclear Magnetic Spectroscopy and Chemical Kinetics*; 2 years; \$25,700.
- TEMPLE UNIVERSITY, Philadelphia, Pa.; Francis H. Case, Department of Chemistry; *Substituted Ferrocene, Cuproene, and Terrocene Reacting Heterocyclic Nitrogen Ligands*; 3 years; \$14,000.
- UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; J. F. Eastham and C. W. Keenan, Department of Chemistry; *Kinetics of Alkali Metal Reactions in Solution*; 2 years; \$6,900.
- TEXAS SOUTHERN UNIVERSITY, Houston, Tex.; Ray Floyd Wilson, Department of Chemistry; *Quantitative Spectrophotometry and Polarography of Rare Earth and Transition Element Complexes*; 2 years; \$7,900.
- UNIVERSITY OF TEXAS, Austin, Tex.; Gilbert H. Ayres, Department of Chemistry; *Analytical Chemistry of the Platinum Metals*; 2 years; \$9,800.
- VANDERBILT UNIVERSITY, Nashville, Tenn.; Donald E. Pearson, Department of Chemistry; *Mechanisms of Electrophilic Reactions*; 3 years; \$12,500.
- UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Clinton D. Cook, Department of Chemistry; *Hindered Phenoxy Radicals*; 3 years; \$16,200.
- UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Loren G. Hepler, Department of Chemistry; *Thermodynamics of Association Reactions in Aqueous Solutions*; 2 years; \$9,700.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; C. David Gutsche, Department of Chemistry; *Synthesis of Seven-Membered Ring Compounds*; 3 years; \$27,200.
- WAYNE UNIVERSITY, Detroit, Mich.; Calvin L. Stevens, Department of Chemistry; *Gem-Dihalides from the Hofmann Reactions*; 2 years; \$15,600.
- WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; E. L. Pace, Department of Chemistry; *Thermodynamics and Structure of Simple Fluorine Compounds*; 2 years; \$8,500.
- WHEATON COLLEGE, Wheaton, Ill.; Stanley M. Parmerter, Department of Chemistry; *Reactions of Hydrazones and Formazyls*; 2 years; \$5,500.
- WILSON COLLEGE, Chambersburg, Pa.; Louise C. Monack, Department of Chemistry; *Nucleophilic Aromatic Substitution*; 2 years; \$5,200.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Louis J. Gosting, Department of Chemistry; *Diffusion Studies on Electrolytes and Proteins*; 3 years; \$17,700.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; William S. Johnson, Department of Chemistry; *Synthesis of Structures Related to the Steroids*; 2 years; \$20,100.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; A. L. Wilds, Department of Chemistry; *Total Synthesis of Non-Aromatic Steroids*; 2 years; \$20,200.
- YALE UNIVERSITY, New Haven, Conn.; William Von E. Doering; Department of Chemistry; *Use of Oxygen-18 in Organic Reaction Mechanism Studies*; 3 years; \$24,400.
- YALE UNIVERSITY, New Haven, Conn.; Lars Onsager, Department of Chemistry; *Theory of Cooperative Phenomena*; 3 years; \$16,100.
- YALE UNIVERSITY, New Haven, Conn.; Andrew Patterson, Jr., Department of Chemistry; *Activity Coefficients by Ebulliometry*; 2 years; \$8,000.

Developmental Biology

- ALBERTUS MAGNUS COLLEGE, New Haven, Conn.; Dorothea Rudnick, Department of Biology; *Glutamotransferase in the Chick Embryo*; 1 year; \$3,800.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Daniel Mazia, Department of Zoology; *Growth and Division in Synchronized Cell Populations*; 1 year; \$11,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Everett C. Olson, Department of Geology; *Biometrical Study of Morphological Integration in Evolution*; 3 years, \$16,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; L. G. Barth, Department of Zoology; *Chemical Embryology*; 2 years; \$11,500.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Earl Frieden, Department of Chemistry; *Biochemistry of Amphibian Metamorphosis*; 3 years; \$8,000.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Charles B. Metz, Department of Zoology; *Physiology of Fertilization in Marine Invertebrates*; 3 years; \$20,100.
- FORDHAM UNIVERSITY, New York, N. Y.; Charles A. Berger, Department of Biology; *Cytological Aspects of Development*; 3 years, \$9,000.
- GRINNELL COLLEGE, Grinnell, Iowa; Guillermo Mendoza, Department of Biology; *Reproduction in the Goodeidae*; 2 years; \$6,000.
- INTERNATIONAL INSTITUTE OF EMBRYOLOGY, Utrecht, Holland; Chr. P. Raven, Secretary; *International Workshop on Embryology*; 1 year; \$1,800.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Jerry J. Kollros, Department of Zoology; *Thyroxin Thresholds and Effects in Anuran Metamorphosis*; 3 years; \$8,500.
- MARQUETTE UNIVERSITY, Milwaukee, Wis.; John W. Saunders, Jr., Department of Biology; *Tissue Interactions During Organogenesis*; 2 years; \$14,000.
- MIAMI UNIVERSITY, Oxford, Ohio; John R. Harrison, Department of Zoology; *In Vitro Growth of Embryonic Chick Eye*; 2 years; \$4,000.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Donald P. Costello, Department of Zoology; *Methods for Obtaining and Handling Marine Eggs and Embryos*; 1 year; \$6,700.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Ralph O. Erickson, Department of Botany; *Cell Division and Cell Growth in Higher Plants*; 1 year; \$9,000.
- UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Walter E. Martin, Department of Biology; *Artificial Culturing of Trematodes*; 1 year; \$3,400.
- STANFORD UNIVERSITY, Stanford, Calif.; Donald L. Stilwell, Department of Anatomy; *Blood Supply of Vertebral Column*; 3 years; \$7,200.
- UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Walter L. Wilson, Department of Physiology and Biophysics, College of Medicine; *Functional and Structural Studies of the Cell Cortex*; 2 years; \$4,600.
- WESLEYAN UNIVERSITY, Middletown, Conn.; Hubert B. Goodrich, Department of Biology; *Color Pattern Formation in Two Teleost Fish*; 2 years; \$7,000.
- WILKES COLLEGE, Wilkes-Barre, Pa.; Francis J. Michelini, Department of Biology; *Plastochron Index in the Elucidation of Plant Development*; 2 years; \$7,400.
- YALE UNIVERSITY, New Haven, Conn.; Edgar John Boell, Department of Zoology, Osborn Zoological Laboratory; *Biochemical Differentiation of the Central Nervous System*; 3 years; \$18,000.
- YESHIVA UNIVERSITY, New York, N. Y.; Salome Gluecksohn-Waelsch, Department of Anatomy, Albert Einstein College of Medicine; *Effect of Genetic Factors on Inductive Interaction in Mouse Embryos*; 3 years; \$26,500.
- YESHIVA UNIVERSITY, New York, N. Y.; Richard N. Stearns, Department of Physiology; *Enzyme Synthesis in Dissociated Embryo Cells*; 1 year; \$5,300.

Earth Sciences

- AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; G. G. Simpson; *Geological Investigation of the Alto Rio Jurua, Brazil*; 1 year; \$8,000.
- UNIVERSITY OF ARIZONA, Tucson, Ariz.; Edmund Schulman, Laboratory of Tree-Ring Research; *Millenium-Long Tree-Ring Histories of Climatic Changes*; 3 years; \$18,800.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; D. T. Griggs, Institute of Geophysics, Los Angeles, Calif.; *Plasticity at High Pressures and Temperatures*; 2 years; \$20,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Robert M. Kleinpell, Department of Paleontology; *Illustration and Identification of Early Tertiary Foraminiferal Types*; 3 years; \$17,200.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; John Verhoogen, Department of Geological Sciences; *Physical Properties of Magnesium-Aluminum Silicates and Oxides*; 2 years; \$12,500.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Horace R. Byers, Department of Meteorology; *Liquid Water Content of Clouds*; 2 years; \$25,800.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; George W. Platzman, Department of Meteorology; *Energy Exchange in Models of the Atmosphere*; 2 years; \$17,600.
- COLUMBIA UNIVERSITY, New York, N. Y.; Maurice Ewing, Lamont Geological Observatory; *Paleoclimate in the Mediterranean Area*; 2 years; \$8,600.
- COLUMBIA UNIVERSITY, New York, N. Y.; J. Lamar Worzel, Lamont Geological Observatory; *Shallow Water Gravity Observations on the Bahamas Platform*; 1 year; \$10,400.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; F. C. W. Olson, Oceanographic Institute; *Salinity and Current Distribution in the St. Marks River Estuary*; 1 year; \$650.
- HARVARD UNIVERSITY, Cambridge, Mass.; Elso S. Barghoorn, Biology Department; *Organic Residues in Fossil Sediments*; 3 years; \$28,800.
- HARVARD UNIVERSITY, Cambridge, Mass.; John P. Miller, Department of Geology; *Geological Processes in the Truchas Mountains, N. Mex.*; 2 years; \$8,800.
- UNIVERSITY OF HAWAII, Honolulu, T. H.; Walter R. Steiger, Geophysics Committee; *Survey of Mount Haleakala as a Coronagraphic Site*; 1 year; \$2,100.
- HIGH ALTITUDE OBSERVATORY OF THE UNIVERSITY OF COLORADO, Boulder, Colo.; Walter Orr Roberts, Director; *Responses of Atmospheric Circulation to Solar Activity*; 6 weeks; \$8,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; George W. White, Department of Geology; *Properties of Glacial Till*; 2 years; \$15,000.
- LAFAYETTE COLLEGE, Easton, Pa.; James R. Beerbower, Department of Geology and Geography; *Paleontology and Paleocology of Dunkard Group*; 2 years; \$4,300.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; William H. Dennen and Ely Mencher, Department of Geology and Geophysics; *Geochemical Investigations of Sedimentary Rocks*; 2 years; \$17,700.
- UNIVERSITY OF MIAMI, Coral Gables, Fla.; Frank Chew, Marine Laboratory; *Heat-Transport of the Florida Current*; 1 year; \$5,000.
- UNIVERSITY OF MIAMI, Coral Gables, Fla.; H. B. Moore, Marine Laboratory; *Oxygen-Density Relationships and Phosphate Content of Caribbean Waters*; 1 year; \$7,800.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Samuel S. Goldich, Department of Geology and Mineralogy and Alfred O. C. Nier, Department of Physics; *Dating of the Igneous Rocks of the Lake Superior Region*; 2 years; \$23,000.

- NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; Robert C. Stephenson, Executive Director; *Operation of the American Geological Institute*; 3 months; \$13,000.
- NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, Socorro, N. Mex.; Frederick J. Kuellmer, New Mexico Bureau of Mines and Mineral Resources; *Exsolution and Triclinicity of Alkali Feldspars in Tertiary Intrusive Rocks of the Cordilleran Region*; 2 years; \$12,700.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Cornelius H. M. Van Bavel, Department of Agronomy; *Soil Moisture Measurements by Neutron Moderation*; 3 years; \$18,400.
- OREGON STATE COLLEGE, Corvallis, Oreg.; W. H. Taubeneck, Department of Geology; *Structure and Petrogenesis of Part of the Wallowa Mountains*; 4 years; \$17,600.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; O. F. Tuttle, Division of Earth Sciences; *Solubility of Volatile Materials in Silicate Liquids and Their Effect on the Melting Temperatures*; 2 years; \$24,000.
- POMONA COLLEGE, Claremont, Calif.; Donald B. McIntyre, Department of Geology; *Metamorphic Rocks of Southern California*; 2 years; \$13,500.
- PRINCETON UNIVERSITY, Princeton, N. J.; Erling Dorf, Department of Geology; *Tertiary Flores of the Yellowstone Park Region, Wyo.*; 3 years; \$15,000.
- PRINCETON UNIVERSITY, Princeton, N. J.; Heinrich D. Holland, Department of Geology; *Radiation Damage Measurements as a Guide in Geologic Age Determinations*; 1 year; \$5,700.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Joe L. White, Department of Agronomy; *Influence of Parent Material and Topography on Soil Genesis*; 2 years; \$18,500.
- SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, Rapid City, S. Dak.; James R. Macdonald; *Paleontological Research*; 1 year; \$875.
- STANFORD UNIVERSITY, Stanford, Calif.; Siemon Wm. Muller, Department of Geology; *Early Mesozoic Paleontology and Stratigraphy*; 3 years; \$9,200.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; J. Vern Hales, Department of Meteorology; *Statistical Studies of Rainfall Patterns*; 1 year; \$2,300.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; Henry N. Andrews, Jr., Henry Shaw School of Botany; *American Carboniferous Plants*; 2 years; \$5,800.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Thomas G. Thompson and Tsaihwa J. Chow, Department of Oceanography; *Distribution of Some Minor Constituents of Sea Water*; 2 years; \$13,500.
- WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Vaughan T. Bowen; *Research Instrumentation for Sampling Sea Water at All Depths*; 1 year; \$3,500.
- YALE UNIVERSITY, New Haven, Conn.; E. S. Deevey, Geochronometric Laboratory; *Radiocarbon Dating and Other Forms of Geochronometry*; 2 years; \$27,200.
- YALE UNIVERSITY, New Haven, Conn.; Paul B. Sears, Conservation Program; *Micro Paleobotanical Study of Sediments*; 2 years; \$6,900.

Engineering Sciences

- BUREAU OF RECLAMATION, DEPARTMENT OF THE INTERIOR, Washington, D. C.; James E. Backstrom, Engineering Laboratories Division, Denver, Colo.; *Air Void System and Durability of Air-Entrained Concrete*; 2 years; \$9,000.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Robert T. Knapp, Division of Engineering; *Mechanics of Cavitation Damage*; 2 years; \$16,700.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; J. Harold Wayland, Division of Engineering; *Streaming Birefringence as a Hydrodynamic Research Tool*; 2 years; \$11,300.

- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Andrew Acrivos and Eugene E. Petersen, Department of Chemistry and Chemical Engineering; *Heat and Mass Transfer in Multiphase Flow Systems*; 2 years; \$9,400.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; R. Hultgren, Department of Metallurgy; *Heat Capacity of Alloys*; 2 years, \$22,600.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; J. W. Johnson, Department of Engineering; *Forces Exerted by Breaking Waves on Piles and Impervious Walls*; 1 year; \$8,700.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; S. F. Ravitz and D. W. Mitchell, Department of Metallurgy; *Heats of Formation and Heat Capacities of Molten Silicate Systems*; 2 years; \$20,700.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Lawrence N. Canjar, Department of Chemical Engineering; *Phase Equilibria and Thermodynamic Data for Mixtures*; 1 year; \$6,000.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; L. A. Finzi, Department of Electrical Engineering; *Rotating Electric Machinery Analysis*; 2 years; \$15,000.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Gaylord W. Penney, Department of Electrical Engineering; *Electrostatic Phenomena Related to Aerosols*; 2 years; \$13,000.
- COLORADO AGRICULTURAL AND MECHANICAL COLLEGE, Fort Collins, Colo.; M. L. Albertson, Department of Civil Engineering; *Flow in Open Channels*; 2 years; \$11,100.
- CORNELL UNIVERSITY, Ithaca, N. Y.; Marshall H. Cohen, Department of Electrical Engineering; *Polarization Dispersion of the 200 mc. Bursts from the Sun*; 3 years; \$23,800.
- UNIVERSITY OF DELAWARE, Newark, Del.; Vaughan C. Behn, Department of Civil Engineering; *Settling and Rheological Properties of Sewage Sludges*; 1 year; \$6,000.
- UNIVERSITY OF FLORIDA, Gainesville, Fla.; Per Bruun, Department of Engineering Mechanics; *Absorption of Water Wave Energy*; 2 years; \$5,800.
- GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; M. R. Carstens, Department of Civil Engineering; *Fluid-Turbulence Characteristics and Diffusion of Solid Particles*; 2 years; \$13,300.
- GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; Werner N. Grunc, School of Civil Engineering; *Treatment and Disposal of Radioactive Sludges*; 2 years; \$14,900.
- HARVARD UNIVERSITY, Cambridge, Mass.; Bruce Chalmers, Division of Applied Sciences; *Kinetics of Crystal Growth from the Melt*; 2 years; \$20,500.
- ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Robert C. Kintner, Department of Chemical Engineering; *Notion of Gas Bubbles and Liquid Drops in a Liquid Medium*; 2 years; \$6,700.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; R. W. Balluffi, Department of Mining and Metallurgical Engineering; *Effect of Crystal Imperfections on Diffusion*; 2 years; \$17,700.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; William J. Fry, Department of Electrical Engineering; *Methods for Producing Uniform High Intensity Ultrasonic Fields*; 2 years; \$22,600.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; James H. Robertson, Department of Theoretical and Applied Mechanics; *Homologous Turbulence*; 2 years; \$18,400.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; H. E. Hoelscher, Department of Chemical Engineering; *Catalytic Reactions in a Water Tunnel*; 2 years; \$9,800.
- KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; P. K. Kadaba, Department of Electrical Engineering; *Dielectric Relaxation of Mixtures of Dipolar Liquids at Microwave Frequencies*; 2 years; \$9,300.

- UNIVERSITY OF MARYLAND, College Park, Md.; S. F. Shen, Department of Aeronautical Engineering; *Laminar Instability of the Mixing of Two Different Cases*; 2 years; \$10,400.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Albert G. H. Deitz, Department of Civil and Sanitary Engineering; *Reinforced Plastics*; 2 years; \$24,800.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Morris Halle, Research Laboratory of Electronics; *Acoustic Analysis of Speech Sounds*; 1 year; \$10,000.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Carl Wagner, Department of Metallurgy; *High Temperature Corrosion of Alloys*; 2 years; \$11,800.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; John S. McNown, Department of Engineering Mechanics; *Effect of Vertical Acceleration on Fall Velocity*; 18 months; \$8,400.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Neal R. Amundson, Department of Chemical Engineering; *Theoretical Analysis of Chemical Reactors*; 2 years; \$22,300.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; H. S. Isbin, Department of Chemical Engineering; *Natural Convection in Regions of Maximum Fluid Densities*; 6 months; \$1,400.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; George W. Preckshot, Department of Chemical Engineering; *Heat Transfer Coefficients of Pool Boiling Liquids*; 2 years; \$8,200.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; Gladwyn V. Lago, Department of Electrical Engineering; *Sampled-Data Feedback Systems*; 18 months; \$10,500.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; L. Leney, Department of Forestry; *Cutting Action in Wood at the Cellular Level*; 2 years; \$6,500.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; M. E. Straumanis, Department of Metallurgical Engineering, School of Mines and Metallurgy, Rolla, Mo.; *Imperfections in Recrystallized and Deformed Materials*; 2 years; \$12,600.
- UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; George C. Ernst, Department of Civil Engineering; *Beam to Column and Knee Connections of Reinforced Concrete*; 3 years; \$8,500.
- UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; E. M. Zwoyer, Department of Civil Engineering; *Shear Strength of Simply Supported Prestressed Concrete Beams with Web Reinforcement*; 18 months; \$10,200.
- UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; J. E. Powers, Department of Chemical Engineering, University of Oklahoma; *Barrier Systems in Thermogravitational Thermal Diffusion Columns*; 2 years; \$11,500.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; David R. Mitchell, Division of Mineral Engineering; *Magnetic Separation of Weakly Magnetic Susceptible Minerals*; 2 years; \$16,100.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; A. H. Waynick, Department of Electrical Engineering; *Dynamical Processes in the Upper Atmosphere*; 2 years; \$23,400.
- POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; Satio Okada, Microwave Research Institute; *Algebraic Electromagnetic Theory*; 1 year; \$9,700.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; J. M. Woods and J. M. Smith, School of Chemical Engineering; *Kinetic Studies of Acetylene Reactions on Solid Catalysts*; 2 years; \$12,700.
- PURDUE UNIVERSITY, Lafayette, Ind.; F. J. Friedlaender, School of Electrical Engineering; *Magnetic Amplifiers*; 2 years; \$19,600.

- RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; Joel O. Hougen, Department of Chemical Engineering; *Reduction of Tungsten Oxides with Hydrogen*; 2 years; \$7,300.
- RUTGERS UNIVERSITY, New Brunswick, N. J.; A. R. Jumikis, Department of Civil Engineering; *Upward Migration of Soil Moisture under Freezing Conditions*; 3 years; \$22,700.
- STANFORD UNIVERSITY, Stanford, Calif.; Robert A. Huggins, Department of Metallurgy; *Mechanism of Internal Oxidation Hardening of Metals*; 2 years; \$12,800.
- STANFORD UNIVERSITY, Stanford, Calif.; John G. Linvill, Department of Electrical Engineering; *Avalanche Phenomenon in Transistors*; 2 years; \$10,000.
- STANFORD UNIVERSITY, Stanford, Calif.; David M. Mason, Department of Chemistry and Chemical Engineering; *Heat Transfer Processes in Chemically Reacting Fluids*; 3 years; \$19,000.
- STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J.; Sidney J. Borg, Department of Civil Engineering; *Theory of Wedge-Water Entry*; 1 year; \$5,300.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Albert L. Babb, Department of Chemical Engineering; *Reaction Kinetics of the System: CO₂-H₂S-Na₂O-H₂O*; 2 years; \$8,800.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; A. E. Harrison, Department of Electrical Engineering; *Modulation Characteristics of Microwave Tubes*; 2 years; \$22,100.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; P. S. Myers, O. A. Uychara and M. M. El-Wakil, Department of Mechanical Engineering; *Combustible Mixture Formation with Liquid Fuels*; 2 years; \$20,700.
- UNIVERSITY OF WYOMING, Laramie, Wyo.; Donald R. Lamb, Department of Civil Engineering; *Nuclear Radiations on Bituminous Materials*; 2 years; \$7,000.
- YALE UNIVERSITY, New Haven, Conn.; F. R. E. Crossley, Department of Mechanical Engineering; *Mechanical Vibration*; 18 months; \$12,000.

Environmental Biology

- AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; C. M. Breder, Jr., Department of Fishes and Aquatic Biology; *Interaction of the Endocrine System, Pigmentation, Behavior, and Light in Teleosts as a Feature of Autecology*; 1 year; \$6,800.
- BEREA COLLEGE, Berea, Ky.; Frank B. Gailey, Department of Biology; *Changes During the Greening of Dark Grown Seedlings*; 3 years; \$14,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Walter E. Howard, Agricultural Experiment Station, Davis, Calif.; *Relation of Soil Fertility to Population Dynamics of Field Rodents*; 3 years; \$10,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Kenneth S. Norris, Los Angeles, Calif. (Marineland of the Pacific Biological Laboratory); *Habitat Selection of the Inter-Tidal Fish, *Girella Nigricans**; 1 year; \$4,100.
- CARLETON COLLEGE, Northfield, Minn.; J. Bruce Guyselmann, Department of Zoology; *Persistent Rhythms of Locomotor Activity in Crustaceans*; 2 years; \$7,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Thomas Park, Hull Zoological Laboratory; *Effect of Irradiation on Laboratory Populations*; 2 years; \$14,800.
- COLORADO AGRICULTURAL AND MECHANICAL COLLEGE, Fort Collins, Colo.; Paul H. Baldwin, Department of Zoology; *Ecology Rocky Mountain Picidae*; 3 years; \$8,800.
- UNIVERSITY OF COLORADO, Boulder, Colo.; John W. Marr, Department of Biology; *Ecology of Certain Areas in the Alaska Range*; 2 years; \$8,800.
- DUKE UNIVERSITY, Durham, N. C.; Howard T. Odum, Department of Zoology; *Stability, Structure, and Metabolism of Steady State Microcosms*; 2 years; \$10,000.

- DUKE UNIVERSITY, Durham, N. C.; F. John Vernberg, Department of Zoology; *Physiological Mechanisms for Climatic Adaptation in Decapod Crustaceans*; 3 years; \$12,800.
- GEORGIA STATE COLLEGE OF BUSINESS ADMINISTRATION, Atlanta, Ga.; Helen B. Jordan, Department of Biology; *Transmission of Saurian Malaria*; 3 years; \$9,200.
- UNIVERSITY OF GEORGIA, Athens, Ga.; Eugene P. Odum, Department of Biology; *Trophic Structure and Productivity of Salt Marsh Ecosystems*; 3 years; \$12,000.
- UNIVERSITY OF GEORGIA, Athens, Ga.; Lawrence R. Pomeroy, Marine Biological Laboratory; *Dynamics of Basic Plant Nutrients in Estuaries*; 3 years; \$14,900.
- UNIVERSITY OF GEORGIA, Athens, Ga.; Robert A. Ragotzkie, Department of Biology; *Nature and Distribution of Organic Detritus in Estuarine Waters*; 3 years; \$14,300.
- UNIVERSITY OF GEORGIA, Athens, Ga.; Charles C. Wilson, Department of Botany; *Productivity of Some Natural Plant Habitats*; 3 years; \$14,700.
- UNIVERSITY OF HAWAII, Honolulu, T. H.; Maxwell S. Doty, Department of Botany; *Pioneer Populations on Recent Lava Flows*; 1 year; \$1,400.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; S. Charles Kendeigh, Department of Zoology; *Physiological and Ecological Studies of Manitoba Flora and Fauna*; 2 years; \$6,900.
- KANSAS STATE COLLEGE, Manhattan, Kans.; Reginald H. Painter; *Interrelations of Host Plants and Insects*; 3 years; \$9,700.
- UNIVERSITY OF KANSAS, Lawrence, Kans.; Charles D. Michener and Robert E. Beer, Department of Entomology; *Biology of the Arthropod Associates of Army Ants*; 2 years; \$4,800.
- KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; John M. Carpenter, Department of Zoology; *Seasonal Fluctuations in the Frequency of Drosophila Species*; 2 years; \$7,100.
- UNIVERSITY OF MIAMI, Coral Gables, Fla.; Hilary B. Moore, Marine Laboratory; *Interactions of Physical Factors in Controlling Vertical Distribution of Zooplankton*; 2 years; \$12,600.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; William R. Dawson, Department of Zoology; *Temperature Adaptations in Reptiles*; 3 years; \$14,100.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Samuel A. Graham, Department of Forestry; *Dynamics in the Ecology of Some Michigan Forests*; 3 years; \$17,800.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; A. Glenn Richards, Department of Entomology and Economic Zoology; *Temperature Effects and Membrane Properties in Insects*; 3 years; \$27,100.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Lloyd L. Smith, Jr., Department of Entomology and Economic Zoology; *Natural Factors in the Success of Fish Reproduction*; 3 years; \$19,800.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; Peter W. Frank, Department of Zoology; *Prediction of Population Growth in Daphnia*; 3 years; \$7,200.
- MONTANA STATE COLLEGE, Bozeman, Mont.; John C. Wright, Department of Botany and Bacteriology; *Limnology of Canyon Ferry Reservoir*; 1 year; \$3,000.
- NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; Lora M. Shields, Department of Biology; *Contribution of Algae to Nitrogen and Organic Content of Desert Soils*; 1 year; \$4,500.
- RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Hugh Wilcox, Department of Forest, Botany, and Pathology, College of Forestry, Syracuse, N. Y.; *Mycorrhizal Association of Pinus Resinosa*; 1 year; \$3,300.
- NORTH DAKOTA AGRICULTURAL COLLEGE, Fargo, N. Dak.; Loren David Potter, Department of Botany; *Phytosociological Studies of Vegetation in the San Augustin Basin*; 1 year; \$7,500.

- OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Elwood B. Shirling, Department of Botany; *Lysogeny and Related Phenomena in the Genus Streptomyces*; 3 years; \$9,000.
- PURDUE UNIVERSITY, Lafayette, Ind.; Clarence J. Goodnight, Department of Biological Sciences; *Arachnids in Relation to Soil Ecology*; 3 years; \$9,000.
- QUINCY COLLEGE, Quincy, Ill.; Troy C. Dorris, Department of Biological Sciences; *Productivity Studies in the Middle Mississippi River*; 1 year; \$3,100.
- STANFORD UNIVERSITY, Stanford, Calif.; Gilbert M. Smith, Department of Biological Sciences; *External Factors in the Development of Sexuality in Chlamydomonas*; 2 years; \$10,000.
- STANFORD UNIVERSITY, Stanford, Calif.; Donald E. Wohlschlag, Department of Biological Sciences; *Seasonal Environmental Effects on the Population Dynamics of a Natural Predator-Prey Relationship*; 3 years; \$8,300.
- TEXAS AGRICULTURAL AND MECHANICAL RESEARCH FOUNDATION, College Station, Tex.; Sewell H. Hopkins, Department of Oceanography; *Ecological Relations Between Phytoplankton and Their Periphytic Bacteria*; 1 year; \$4,400.
- UNIVERSITY OF TEXAS, Austin, Tex.; Irwin Spear, Department of Botany; *Physiology of Photoperiodic Effects in Plants*; 2 years; \$10,500.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; W. T. Edmonson, Department of Zoology; *Arid Land Limnology*; 1 year; \$9,900.
- WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Laurence Irving, Associate in Physiology; *Regulation of Body Heat in Homiothermous Animals*; 1 year; \$4,900.
- WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Gordon A. Riley; *Productivity of the Benthos in Coastal Waters*; 2 years; \$9,700.
- WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; John H. Ryther; *Effects of Ultraviolet Radiation Upon Marine Plankton Algae*; 2 years; \$11,400.
- WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; William C. Schroeder, Ichthyologist; *Biology of Larger Pelagic Fishes of the Western Atlantic*; 3 years; \$30,000.
- UNIVERSITY OF WYOMING, Laramie, Wyo.; Kenneth R. John, Jackson Hole Biological Research Station; *Predator-Prey Relationships in a Fish Community*; 2 years; \$6,500.
- YALE UNIVERSITY, New Haven, Conn.; Edward S. Deevey, Jr., Osborn Zoological Laboratory; *Animal and Plant Microfossils in Lake Sediments*; 2 years; \$7,100.

Genetic Biology

- ALABAMA POLYTECHNIC INSTITUTE, Auburn, Ala.; S. A. Edgar and L. W. Johnson, Department of Poultry Husbandry; *Cellular Antigens in Reproduction and Livability of Chickens*; 3 years; \$8,100.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Renato Dulbecco, Department of Biology; *Quantitative Study of Animal Virus-Host Complexes*; 1 year; \$15,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Harlan Lewis, Department of Botany, Los Angeles; *Race and Species Formation in the Genus Clarkia*; 3 years; \$22,500.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Benson E. Ginsburg, The College; *Mechanisms of Gene Action in Sound Induced Seizures*; 2 years; \$12,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Aaron Novick, Biological Sciences Division; *Bacterial Mutation Rates*; 1 year; \$10,600.
- EMORY UNIVERSITY, Emory University, Ga.; Charles Ray, Jr., Department of Biology; *Cytogenetics of Tetrahymena Pyriformis*; 2 years; \$8,100.
- HARVARD UNIVERSITY, Cambridge, Mass.; Paul C. Mangelsdorf, Department of Biology; *The Evolution of the Maize Plant*; 2 years; \$11,500.

- HOWARD UNIVERSITY, Washington, D. C.; David T. Ray, Department of Zoology; *Sensitivity of Different Meiotic Stages of the Eggs of Mormoniella*; 2 years; \$6,500.
- INDIANA UNIVERSITY, Bloomington, Ind.; Richard C. Starr, Department of Botany; *Nuclear and Cytoplasmic Inheritance in the Desmids*; 2 years; \$6,800.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; C. P. Swanson, Department of Botany; *Role of Oxygen in Chemical Mutagenesis*; 1 year; \$7,800.
- LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; M. Demerec, Director; *Genes and Chromosomes in Bacteria*; 2 years; \$19,800.
- MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Allen S. Fox, Department of Zoology; *Immunogenetic Studies of Position Effect in Drosophila Melanogaster*; 1 year; \$7,600.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Joseph G. Gall, Department of Zoology; *Submicroscopic Morphology of the Animal Cell Nucleus*; 2 years; \$13,800.
- RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Evelyn M. Witkin, Department of Medicine, College of Medicine at New York City; *Induced Mutations in Bacteria*; 2 years; \$20,000.
- NEW YORK UNIVERSITY, New York, N. Y.; W. Lane Barksdale, Department of Microbiology; *Prophage and Toxin Production in Corynebacterium*; 3 years; \$12,000.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Ben W. Smith, Department of Genetics, Agricultural Experiment Station; *Relation of Dioecious Sexual Reproduction to the Natural Occurrence of Polyploidy*; 2 years; \$10,000.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; A. Gib De Busk, Department of Biological Sciences; *Enzymes and Enzyme Systems in Mutation*; 3 years; \$20,500.
- OHIO STATE UNIVERSITY, Columbus, Ohio; Margaret C. Green, Department of Zoology and Entomology; *Development in Short-Ear Mutant Mice*; 2 years; \$15,500.
- OHIO STATE UNIVERSITY, Columbus, Ohio; Henry L. Plaine, Department of Zoology and Entomology; *Induction of Uncontrolled Growths and Pheno-Copies by Specific Genes in Drosophila*; 2 years; \$10,500.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; J. Ralph Shay, Department of Botany and Plant Pathology; *Study in Host-Parasite Relationship*; 3 years; \$21,000.
- SANTA BARBARA BOTANIC GARDEN, Santa Barbara, Calif.; Marta S. Walters; *Spontaneous Chromosome Breakage in Hybrid Plants*; 2 years; \$14,000.
- SOUTH DAKOTA STATE COLLEGE, College Station, S. Dak.; James G. Ross, Department of Agronomy; *Homozygous Diploid Mutants in Sorghum*; 3 years; \$17,400.
- VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; James McDonald Grayson, Department of Biology; *Genetics of Resistance to Insecticides in the German Cockroach*; 1 year; \$600.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; H. L. Carson, Department of Zoology; *Population Genetics, Ecology, and Parthenogenesis in Diptera*; 3 years; \$22,200.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; W. Siang Hsu, Department of Zoology, *Bdelloid Cytology*; 2 years; \$2,300.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Herschel Roman and David R. Stadler, Department of Botany; *Chromosome Mapping in Yeast and Neurospora*; 3 years; \$11,400.
- WESLEYAN UNIVERSITY, Middletown, Conn.; Ernst Caspari, Department of Biology; *Genetic Control of the Formation of Pigment Granules in Ephestia*; 2 years; \$9,000.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; R. A. Brink, Department of Genetics; *Mutable Alleles at the P Locus in Maize*; 3 years; \$22,500.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Joshua Lederbert, Department of Genetics; *Genetic Transduction by Bacteriophage*; 3 years; \$23,000.

Mathematical Sciences

- AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; C. E. Allendoerfer, Chairman; *Differential Geometry in the Large*; Summer of 1956; \$31,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Leon Henkin, Department of Mathematics; *Concept of Formal Systems*; 3 months; \$1,900.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Ernst G. Straus, Department of Mathematics, Los Angeles, Calif.; *Arithmetic of Analytic Functions*; 1 year; \$3,800.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; J. G. van der Corput; Department of Mathematics; *Asymptotic Expansions*; 2 years; \$31,500.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Augustus F. Bausch, Department of Mathematics; *Logistic Method and Effective Processes*; 1 year; \$6,100.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Paul R. Halmos, Department of Mathematics; *Algebraic Logic and Set Theory*; 3 years; \$8,850.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Andre Weil, Department of Mathematics; *Abelian Varieties and Their Applications*; 1 year; \$7,200.
- UNIVERSITY OF COLORADO, Boulder, Colo.; Sarvadaman Chowla, Department of Mathematics; *Theory of Dirichlet L-Series*; 2 years; \$13,800.
- COLUMBIA UNIVERSITY, New York, N. Y.; Samuel Eilenberg, Department of Mathematics; *Homological Algebra and Homotopy Theory*; 2 years; \$16,800.
- COLUMBIA UNIVERSITY, New York, N. Y.; E. R. Lorch, Department of Mathematics; *Volume in Hilbert Space*; 2 years; \$9,500.
- DARTMOUTH COLLEGE, Hanover, N. H.; John G. Kemeny, Department of Mathematics; *Mathematical Methods in the Behavioral Sciences*; 2 years; \$14,000.
- GOUCHER COLLEGE, Baltimore, Md.; Mary Elizabeth Hamstrom, Department of Mathematics; *Continuous Collections of Continuous Curves*; 1 year; \$4,900.
- HARVARD UNIVERSITY, Cambridge, Mass.; R. Brauer, J. Tate, and O. Zariski, Department of Mathematics; *Algebra, Number Theory, and Algebraic Geometry*; 2 years; \$32,700.
- INDIANA UNIVERSITY, Bloomington, Ind.; V. Hlavaty, E. Hopf, and J. W. T. Youngs, Department of Mathematics; *Geometry and Rational Mechanics*; 2 years; \$50,000.
- INDIANA UNIVERSITY, Bloomington, Ind.; George Whaples, Department of Mathematics; *Local Class Field Theory*; 2 years; \$11,500.
- INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; Hassler Whitney and Arne Beurling, Department of Mathematics; *Studies in Group Theory, Algebraic Geometry, and Finite Groups*; 2 years; \$33,000.
- UNIVERSITY OF KANSAS, Lawrence, Kans.; G. Baley Price, Department of Mathematics; *Geometry of Function Space*; 2 years, \$36,500.
- KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; V. F. Cowling, Department of Mathematics, University of Kentucky, Lexington, Ky.; *Summability and Analytic Functions*; 1 year; \$6,600.
- KENYON COLLEGE, Gambier, Ohio; O. M. Nikodym, Department of Mathematics; *Ordered Algebraic Fields*; 2 years; \$11,700.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Warren Ambrose and Witold Hurewicz, Department of Mathematics; *Topics in Topology and Differential Geometry*; 2 years; \$32,400.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; R. C. Lyndon, R. M. Thrall and J. E. McLaughlin, Department of Mathematics; *Algebras, Groups, and Lattices*; 2 years; \$17,200.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; Joseph L. Zemmer, Department of Mathematics; *A Class of Non-Associative Algebras*; 1 year; \$3,300.
- NEW YORK UNIVERSITY, New York, N. Y.; Lipman Bers, Institute of Mathematical Sciences; *Partial Differential Equations of Mixed Type*; 1 year; \$7,500.

- NEW YORK UNIVERSITY, New York, N. Y.; Lipman Bers and K. O. Friedrichs, Department of Mathematics; *Functional Analysis*; 2 years; \$26,000.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; R. P. Boas, Jr., Department of Mathematics; *Problems in Trigonometric Series*; 2 years; \$13,900.
- UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Ky Fan, James Jenkins, and Vladimir Seidel, Department of Mathematics; *Problems in Analysis*; 3 years; \$61,000.
- UNIVERSITY OF OKLAHOMA, Norman, Okla.; Casper Goffman, Department of Mathematics; *Ordered Systems*; 2 years; \$8,000.
- UNIVERSITY OF OREGON, Eugene, Oreg.; Paul Civin and Bertram Yood, Department of Mathematics; *Semi-Reflexive Spaces*; 18 months; \$7,800.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Murray Gerstenhaber and I. N. Herstein, Department of Mathematics; *Algebraic Functions and Simple Rings*; 2 years; \$14,500.
- PRINCETON UNIVERSITY, Princeton, N. J.; F. E. P. Hirzebruch, Department of Mathematics; *Topological Methods in Algebraic Geometry*; 6 month; \$3,500.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Lamberto Cesari, Department of Mathematics, Purdue University, Lafayette, Ind.; *Periodicity and Stability for Differential Systems*; 1 year; \$3,000.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; J. H. B. Kemperman, Department of Mathematics, Purdue University, Lafayette, Ind.; *Distribution of Round-Off Errors*; 2 years; \$12,500.
- QUEENS COLLEGE, Flushing, N. Y.; Leo Zippin, Department of Mathematics; *Topological Transformation Groups*; 2 years; \$15,200.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Mary Ellen Rudin, Department of Mathematics; *Topological Properties of Non-Compact Spaces*; 1 year; \$4,700.
- TULANE UNIVERSITY, New Orleans, La.; A. D. Wallace, Department of Mathematics; *Topological Algebra*; 2 years; \$60,000.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; C. E. Burgess, Department of Mathematics; *Homogeneous Continua*; 1 year; \$5,300.
- VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; Maurice C. K. Tweedie, Department of Mathematics; *Statistical Estimation Theory*; 2 years; \$11,700.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Edwin Hewitt and F. H. Brownell, Department of Mathematics; *Functional Analysis*; 3 years; \$60,000.
- WAYNE UNIVERSITY, Detroit, Mich.; George Lorentz, Department of Mathematics; *Banach Spaces and Summability*; 2 years; \$13,500.

Molecular Biology

- HUGO BAUER, Bethesda, Md.; *Analysis and Identification of Products of Histidine Metabolism*; 1 year; \$2,500.
- BARNARD COLLEGE, New York, N. Y.; Helen B. Funk, Department of Botany; *Hemoglobin in Root Nodules of Legumes*; 2 years; \$9,000.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Dan H. Campbell, Robert B. Corey, and James F. Bonner, Division of Chemistry and Chemical Engineering, and Division of Biology; *High Molecular Weight Biological Compounds*; 3 years; \$16,000.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Herschel K. Mitchell, Division of Biology; *Nature and Function of Some Phospholipids*; 3 years; \$18,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Robert W. Cowgill, Department of Biochemistry; *Metabolism of Methylhistidines and Anserine in Animal Tissues*; 3 years; \$8,500.

- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Donald L. MacDonald, Department of Biochemistry; *Studies on the Degradation of Sugars Via Their Disulfones*; 3 years; \$9,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Allen G. Marr, Department of Bacteriology, Davis, Calif.; *Metabolism of Hydrogen*; 2 years; \$11,500.
- CARNEGIE INSTITUTION OF WASHINGTON, Washington, D. C.; David W. Bishop, Department of Embryology, Baltimore, Md.; *Molecular Basis of Sperm Activity*; 1 year; \$1,600.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Lawrence Bogorad, Department of Botany; *Enzymatic Synthesis of Porphyrins From Porphobilinogen*; 3 years; \$23,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Kenneth D. Kopple, Department of Chemistry; *Interaction of Amines and Carbonyl*; 2 years; \$9,500.
- THE CHILDREN'S HOSPITAL OF PHILADELPHIA, Philadelphia, Pa.; Fred Karush, Professor of Immunology; *Structural Role of the Intramolecular Disulfide Bond in Proteins*; 2 years; \$15,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; Robert R. Becker, Department of Chemistry; *Reaction of N-Carboxyamino Acid Anhydrides with Proteins*; 3 years; \$12,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; Bernard F. Erlanger and Sam M. Beiser, Department of Microbiology, and Seymour Lieberman, Department of Obstetrics and Gynecology, College of Physicians and Surgeons; *Chemical, Biological, and Immunochemical Properties of Steroid Hormone-Protein Conjugates*; 2 years; \$14,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; William L. Nastuk, Department of Physiology, College of Physicians and Surgeons; *Ionic Permeability Change Produced at the End-Plate Membrane*; 2 years; \$21,000.
- CONNECTICUT AGRICULTURAL EXPERIMENT STATION, New Haven, Conn.; H. B. Vickery, Chief Biochemist; *Metabolism of the Organic Acids of Leaves*; 3 years; \$24,500.
- CORNELL UNIVERSITY, Ithaca, N. Y.; Harold A. Scheraga, Department of Chemistry; *Thermodynamic Properties of Proteins*; 3 years; \$18,000.
- UNIVERSITY OF DELAWARE, Newark, Del.; John C. Wriston, Jr., Department of Chemistry; *Metabolism of One-Carbon Compounds*; 3 years; \$20,000.
- DUQUESNE UNIVERSITY, Pittsburgh, Pa.; Norman C. Li, Department of Chemistry; *Thermodynamics and Kinetic Studies of Metal Complexes with Some Peptides and Related Substances*; 3 years; \$20,000.
- UNIVERSITY OF GEORGIA, Athens, Ga.; Paul R. Burkholder, Department of Bacteriology; *Obligate and Facultative Photoautotrophy in the Genus Chlamydomonas*; 2 years; \$9,300.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; S. S. Barkulis, Department of Biological Chemistry; *Immunochemical Methods for the Measurement and as an Index of Purity of Streptococcal Components and Antigens*; 2 years; \$11,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; L. M. Henderson, Department of Chemistry and Chemical Engineering; *Biological Oxidation of 3-Hydroxyanthranilate*; 2 years; \$13,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; Clyde W. Kearns, Department of Entomology; *Purification and Study of the Mechanism of Action of the Enzyme DDT-Dehydrochlorinase*; 2 years; \$16,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; Terrell C. Myers, Department of Biological Chemistry; *Phosphonic Acid Analogs of Nucleoside Phosphates*; 2 years; \$11,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; Elizabeth Thorogood, Department of Bacteriology; *Microbial Chromoproteins*; 1 year; \$9,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; Willis A. Wood, Dairy Science Department; *Oxidative, Cleavage, and Transfer Reactions in Aerobic Bacteria*; 3 years; \$17,500.

- INSTITUTE FOR CANCER RESEARCH AND THE LANKENAU HOSPITAL RESEARCH INSTITUTE, Philadelphia, Pa.; Theodore F. Lavine, Department of General Biochemistry; *Biochemical Reactions of Aldehydes with Sulfur Compounds*; 2 years; \$7,500.
- IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; David E. Metzler and Ernest Wenkert, Department of Chemistry; *Mechanism of the Catalytic Action of Riboflavin*; 2 years; \$10,000.
- IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; Robert L. Sinsheimer, Department of Physics; *Structure of the Ribose Nucleic Acid of Tobacco Mosaic Virus*; 2 years; \$10,000.
- IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; Robert L. Sinsheimer, Department of Physics, Dexter French and William F. Harrington, Department of Chemistry; *Ultra Centrifugal Preparations and Analyses*; 3 years; \$18,500.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; George Kalnitsky, Department of Biochemistry, College of Medicine; *Mechanism of Action of Enzymes: Ribonuclease*; 3 years; \$14,000.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Charles Tanford, Department of Chemistry; *Physical Chemistry of Aqueous Solutions of Proteins*; 3 years; \$19,000.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Albert L. Lehninger, Department of Physiological Chemistry; *Biochemical Aspects of The Secretory Functions of Mitochondria*; 3 years; \$21,000.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Alvin Nason, McCollum-Pratt Institute; *Inorganic Nitrogen Metabolism of Nitrogen-Fixing Organisms*; 3 years; \$27,000.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Robert Van Reem, McCollum-Pratt Institute; *Interrelationships Between Micronutrient and Enzyme Systems*; 2 years; \$10,000.
- UNIVERSITY OF KANSAS, Lawrence, Kans.; Harold Edelhoeh, Department of Pathology and Ancology; *Effects of Denaturing Agents on Kinetics Pepsin Denaturation*; 2 years; \$10,000.
- UNIVERSITY OF KANSAS, Lawrence, Kans.; Philip Newmark, Department of Biochemistry; *Pyrimidine and Purine Biosynthesis in Tobacco Plants*; 2 years; \$9,000.
- MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Albert Szent-Gyorgyi, Institute for Muscle Research; *Mechano-Chemical Coupling in Muscle*; 3 years; \$34,500.
- MARQUETTE UNIVERSITY, Milwaukee, Wis.; Michael Laskowski, Department of Biochemistry, School of Medicine; *Proteolytic Inhibitors*; 3 years; \$27,000.
- MASSACHUSETTS GENERAL HOSPITAL, Boston, Mass.; Roger W. Jeanloz; *Uridine-Diphosphate-Aminosugar Derivatives*; 3 years; \$20,500.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Richard S. Bear, Department of Biology; *Structure of Fibrous Systems by Means of Optical Analogue Diffraction*; 2 years; \$19,000.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; John M. Buchanan, Division of Biochemistry; *Enzyme Systems in Synthesis of Nucleic Acids*; 3 years; \$30,000.
- MEHARRY MEDICAL COLLEGE, Nashville, Tenn.; Edward G. High, Department of Biochemistry; *Spectrophotometric Studies of Selected Carotenoids*; 2 years; \$11,000.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; M. J. Coon, Department of Biological Chemistry; *Studies on Amino Acid Metabolism*; 1 year; \$8,100.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Armand J. Guarino, Department of Biological Chemistry; *Incorporation of Guanine-8-C¹⁴ into the Acid-Soluble Nucleotides of Rat Liver*; 2 years; \$9,000.

- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Albert W. Frenkel, Department of Botany; *Phosphorylation by Cell-Free Preparations of Purple Bacteria*; 3 years; \$24,000.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; H. Burr Steinbach, Department of Zoology; *Ion Binding and Enzyme Activation in Muscle*; 3 years; \$22,000.
- MOUNT SINAI HOSPITAL, New York, N. Y.; Ross F. Nigrelli and Harry Sobotka, Department of Chemistry; *Steroid Glycosides from Marine Animals*; 2 years; \$12,000.
- NAZARETH COLLEGE, Louisville, Ky.; Sister Virginia Heines, Department of Chemistry; *Mechanism of Inhibition of Peroxidase by Organic Mercurial Chemistry*; 3 years; \$1,400.
- UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; J. H. Pazur, Department of Biochemistry and Nutrition, Agricultural Experiment Station; *Galactosyl Oligosaccharides*; 2 years; \$11,500.
- RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Dan A. Richert and Martin P. Schulman, Department of Biochemistry, College of Medicine, Syracuse, N. Y.; *Mechanism of Action of Pyridoxal Phosphate on Glycine Metabolism with Special Reference to Heme Synthesis*; 2 years; \$9,000.
- NEW YORK UNIVERSITY, New York, N. Y.; Elijah Adams, Department of Pharmacology, College of Medicine; *The Metabolism of Certain Amino Acids in Bacteria*; 2 years; \$12,000.
- OREGON STATE COLLEGE, Corvallis, Oreg.; Tsoo E. King and Frank P. McWhorter, School of Science; *Biochemical Studies of a New Virus*; 3 years; \$12,000.
- UNIVERSITY OF OREGON, Eugene, Oreg.; F. J. Reithel, Department of Chemistry; *Carbohydrate Metabolism of the Sapotaceae*; 2 years; \$12,000.
- UNIVERSITY OF OREGON, Eugene, Oreg.; Bradley T. Scheer, Department of Biology and Pierre van Rysselberghe, Department of Chemistry; *Thermodynamics of Diffusion and Active Transport of Ions Considered as Irreversible Processes*; 3 years; \$15,000.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Philip George, John Harrison Laboratory of Chemistry; *Physicochemical Origin of the Specificity of Haemoprotein Reactions*; 3 years; \$25,000.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Samuel Gurin, Department of Biochemistry; *Metabolic Processes in Mammalian and Plant Tissues*; 3 years; \$29,000.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; L. V. Heilbrunn, Department of Zoology; *Colloidal Behavior of Various Types of Protoplasm*; 2 years; \$5,600.
- UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Klaus Hofmann, Department of Biochemistry; *New Routes to Complex Polypeptides*; 3 years; \$16,500.
- PRINCETON UNIVERSITY, Princeton, N. J.; Walter Kauzmann, Department of Chemistry; *Denaturation of Proteins*; 3 years; \$24,000.
- UNIVERSITY OF PUERTO RICO, San Juan, P. R.; David B. Tyler, Department of Pharmacology; *Kinetics and Biological Significance of Metal Complexes of Oxaloacetic Acid*; 2 years; \$11,000.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Seymour Benzer, Department of Physics, Purdue University, Lafayette, Ind.; *Genetic Fine Structure and Its Relation to the Molecular Structure of Desoxyribonucleic Acid*; 3 years; \$26,500.
- PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Joseph F. Foster, Department of Chemistry, Purdue University, Lafayette, Ind.; *Physical Chemistry of Polysaccharides*; 3 years; \$17,000.
- REED COLLEGE, Portland, Oreg.; Arthur H. Livermore, Department of Chemistry; *Synthesis of Glutathione by the Yeast *T. Utilis**; 1 year; 2,800.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Harold F. Parks, Department of Anatomy, School of Medicine and Dentistry; *Electron Microscopy*; 1 year; \$1,280.

- RUTGERS UNIVERSITY, New Brunswick, N. J.; Michael Heidelberger, Institute of Microbiology; *Chemical Constitution and Immunological Specificity*; 3 years; \$39,000.
- TEXAS A. AND M. RESEARCH FOUNDATION, College Station, Tex.; Raymond Reiser, Department of Biochemistry and Nutrition, Texas Agricultural Experiment Station; *Metabolism of Glycerides*; 2 years; \$12,000.
- TRINITY COLLEGE, Hartford, Conn.; W. Scott Worrall, Department of Chemistry; *Reaction Mechanisms of Certain Protein Enzymes*; 3 years; \$11,000.
- TUFTS COLLEGE, Medford, Mass.; Alton Meister, Department of Biochemistry; School of Medicine; *Glutamine Metabolism*; 3 years; \$30,000.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; John D. Spikes; *Kinetics of the Photochemical Activity of Isolated Chloroplasts*; 3 years; \$15,000.
- VANDERBILT UNIVERSITY, Nashville, Tenn.; Oscar Touster, Department of Biochemistry, School of Medicine; *The Metabolism of L-Xylulose*; 3 years, \$25,500.
- VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; Kendall W. King, Department of Biology; *Significance of the Cellulodextrins Produced During Enzymatic Hydrolysis of Cellulose*; 3 years; \$10,000.
- WAKE FOREST COLLEGE, Winston-Salem, N. C.; Samuel H. Love, Department of Microbiology and Immunology; *Purine Metabolism in Bacteria*; 2 years; \$10,000.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; Barry Commoner, Henry Shaw School of Botany; *Nucleoproteins in Growing Leaves*; 3 years; \$15,000.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; Martin D. Kamen, Institute of Radiology; *Photo-Activation and Electron Transfer in Bacteria*; 5 years; \$32,500.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Philip E. Wilcox, Department of Biochemistry; *Chemical Modification of Proteins*; 2 years; \$10,500.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Reinhold Benesch, Institute for Enzyme Research; *Reactivity of Sulfhydryl Groups in Peptides and Proteins*; 1 year; \$4,000.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Lafayette H. Noda, Institute for Enzyme Research; *High-Energy-Phosphate Transferring Enzymes*; 3 years; \$17,000.
- YALE UNIVERSITY, New Haven, Conn.; Henry A. Harbury, Department of Chemistry; *Prosthetic Group Interaction in Proteins*; 3 years; \$12,000.
- YESHIVA UNIVERSITY, New York, N. Y.; Alex B. Novikoff, Department of Pathology, Albert Einstein College of Medicine; *Biochemical and Electron Microscope Study of Microsomes*; 2 years; \$13,000.
- YESHIVA UNIVERSITY, New York, N. Y.; Jonathan Wittenberg, Department of Medicine; *Biosynthesis of Sphingosine and the Structure of Related Compounds*; 3 years; \$20,000.

Physics

- AMHERST COLLEGE, Amherst, Mass.; R. H. Romer, Department of Physics; *Nuclear Spin Relaxation in Metals*; 2 years; \$10,800.
- ANTIOCH COLLEGE, Yellow Springs, Ohio; A. B. Stewart and G. E. Owen, Department of Physics; *Glow Discharge Oscillations*; 3 years; \$15,700.
- UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; B. L. Robinson, Department of Physics and R. W. Fink, Department of Chemistry; *Coincidence Studies of Nuclear Decay Schemes*; 2 years, \$20,700.
- BOWDOIN COLLEGE, Brunswick, Maine; M. A. Jeppesen, Department of Physics; *Optical Studies of Crystalline and Amorphous Solids*; 3 years; \$16,100.
- BRYN MAWR COLLEGE, Bryn Mawr, Pa.; W. C. Michels, Department of Physics; *Nuclear Solid-State and Bioelectric Research*; 3 years; \$24,100.
- BROWN UNIVERSITY, Providence, R. I.; P. J. Bray, Department of Physics; *Nuclear Resonance Investigation of Molecular and Crystalline Structure*; 2 years; \$10,300.

- BROWN UNIVERSITY, Providence, R. I.; Rohn Truell, Research Division of Applied Mathematics; *High Precision Ultrasonic Velocity Measurements*; 1 year; \$4,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; David S. Saxon, Department of Physics; *Theoretical Optical Model of the Nucleus*; 2 years; \$48,600.
- CARLETON COLLEGE, Northfield, Minn.; Frank Verbrugge, Department of Physics; *Carrier Mobilities in Mixed Alkali Halide Crystals*; 3 years; \$14,700.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; M. G. Inghram, Department of Physics; *Mass Spectrometric Investigations*; 3 years; \$43,700.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Marcel Schein, Department of Physics; *Production and Interaction of Hyperons and Heavy Mesons*; 2 years; \$20,800.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Marcel Schein, Department of Physics; *Institute for Cooperative Emulsion Research*; 8 weeks; \$11,500.
- COLUMBIA UNIVERSITY, New York, N. Y.; H. A. Boorse, Department of Physics; *Research on Superconductors*; 2 years; \$33,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; H. M. Foley, Department of Physics; *Nuclear Structure Problems and Hyperfine Interactions*; 2 years; \$19,200.
- CORNELL UNIVERSITY, Ithaca, N. Y.; Kenneth Greisen, Department of Physics; *Cosmic Ray Air Shower and Particle Study*; 2 years; \$35,600.
- CORNELL UNIVERSITY, Ithaca, N. Y.; H. S. Sack, Department of Engineering Physics; *Dielectric Dispersion in Illuminated Phosphors of the ZnS Type*; 3 years; \$13,500.
- DEPAUW UNIVERSITY, Greencastle, Ind.; Austin D. Sprague, Department of Physics; *High Energy Particles in Nuclear Emulsions*; 1 year; \$4,300.
- DUKE UNIVERSITY, Durham, N. C.; William M. Fairbank, Department of Physics; *Theoretical Study of Quantum Liquids*; 1 year; \$4,500.
- DUKE UNIVERSITY, Durham, N. C.; L. W. Nordheim and E. Greuling, Department of Physics; *Nuclear Shell Structure*; 2 years; \$20,100.
- UNIVERSITY OF IDAHO, Moscow, Idaho; Mark Gurevitch, Department of Physical Sciences; *Production and Characteristics of Small Metal Particles*; 2 years; \$7,700.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; W. G. Moulton, Department of Physics; *Nuclear Resonance Study of the Amino Group*; 2 years; \$8,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; C. S. Robinson, Department of Physics; *High Energy Nuclear Phenomena*; 3 years; \$26,100.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; G. H. Dicke, Department of Physics; *Spectroscopy of Rare Earths at Low Temperatures*; 1 year; \$4,700.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; H. Meissner, Department of Physics; *Intermediate State of Superconductivity*; 2 years; \$16,900.
- MARQUETTE UNIVERSITY, Milwaukee, Wis.; A. G. Barkow, Department of Physics; *Elementary Particle Reactions in Photographic Emulsions*; 2 years; \$4,300.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; G. R. Harrison, Department of Physics; *Interferometric Control of the Ruling of Diffraction Gratings*; 1 year; \$10,000.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Bruno B. Rossi, Department of Physics; *Cosmic Ray Research*; 3 years; \$25,100.
- MIDWESTERN UNIVERSITIES RESEARCH ASSOCIATION, Urbana, Ill.; D. W. Kerst, University of Illinois; *High-Energy Accelerator Problems*; 9 months; \$100,000.
- MIDWESTERN UNIVERSITIES RESEARCH ASSOCIATION, Urbana, Ill.; D. W. Kerst, University of Illinois; *High-Energy Accelerator Problems*; 9 months; \$60,000.
- MONTANA STATE UNIVERSITY, Missoula, Mont.; M. J. Jakobson, Department of Physics; *Measurement of Photo-Neutron Cross Sections*; 2 years; \$10,300.
- NEW YORK UNIVERSITY, New York, N. Y.; H. Kallmann, Department of Physics; *Metastable States in Fluorescent Processes*; 2 years; \$13,200.
- NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; C. Beck, Department of Physics; *Nuclear Reactor Operations and Research*; 1 year; \$15,000.

- NORTHWESTERN UNIVERSITY**, Evanston, Ill.; S. Broersma, Department of Physics; *Nuclear Magnetic Relaxation of Non-Uniform Systems*; 2 years; \$9,700.
- NORTHWESTERN UNIVERSITY**, Evanston, Ill.; J. A. Marcus, Department of Physics; *Magnetic Properties of Single Crystals at Low Temperatures*; 2 years; \$13,600.
- OHIO STATE UNIVERSITY**, Columbus, Ohio; J. G. Daunt, Department of Physics; *Physical Phenomena at Very Low Temperatures*; 3 years; \$76,000.
- OHIO STATE UNIVERSITY**, Columbus, Ohio; H. H. Nielsen, Department of Physics; *Infra-Red Spectra of Polyatomic Molecules*; 3 years; \$42,200.
- UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE**, Norman, Okla.; Chun C. Lin, Department of Physics; *Internal Rotation of Molecules*; 2 years; \$17,200.
- UNIVERSITY OF OREGON**, Eugene, Oreg.; S. Y. Ch'en, Department of Physics; *Shift and Broadening of Spectral Lines under High Pressures*; 3 years; \$25,500.
- UNIVERSITY OF OREGON**, Eugene Oreg.; J. L. Powell, Department of Physics; *Dynamics of Synchrotron Orbits*; 1 year; \$4,700.
- UNIVERSITY OF PENNSYLVANIA**, Philadelphia, Pa.; M. E. Caspari, Department of Physics; *Dielectric Breakdown in Crystals*; 2 years; \$13,200.
- UNIVERSITY OF PENNSYLVANIA**, Philadelphia, Pa.; B. Chance, Johnson Foundation for Medical Physics; *Physical Methods for the Measurement of Biological Phenomena*; 3 years; \$35,300.
- PURDUE RESEARCH FOUNDATION**, Lafayette, Ind.; Frederik J. Belinfante, Department of Physics, Purdue University, Lafayette; *Field Theory of Interacting Particles*; 3 years; \$12,000.
- PURDUE RESEARCH FOUNDATION**, Lafayette, Ind.; H. M. James, Department of Physics, Purdue University, Lafayette, Ind.; *Imperfections in Bombarded Semiconductors*; 2 years, \$12,500.
- PURDUE RESEARCH FOUNDATION**, Lafayette, Ind.; K. W. Meissner, Department of Physics, Purdue University, Lafayette, Ind.; *Precision Interferometric Wavelength Measurements*; 3 years; \$21,100.
- UNIVERSITY OF REDLANDS**, Redlands, Calif.; A. V. Baez, Department of Physics; *X-Ray Microscopy*; 1 year; \$4,800.
- ST. LOUIS UNIVERSITY**, St. Louis, Mo.; W. A. Barker, Department of Physics; *Knight Shift in Metals and Semiconductors*; 2 years; \$9,400.
- UNIVERSITY OF TENNESSEE**, Knoxville, Tenn.; D. T. King, Department of Physics; *Multiple Meson Production in Energetic Collisions of Nucleons*; 2 years; \$19,700.
- UNIVERSITY OF TEXAS**, Austin, Tex.; D. S. Hughes, Department of Physics; *Elastic Properties of Solids at High Pressure and Temperature*; 2 years; \$12,400.
- VANDERBILT UNIVERSITY**, Nashville, Tenn.; S. K. Haynes, Department of Physics; *Beta-Ray Spectroscopy at Very Low Energies*; 2 years; \$12,800.
- UNIVERSITY OF VIRGINIA**, Charlottesville, Va.; J. W. Beams, Department of Physics; *Ultracentrifuge Method for Molecular Weights Measurement*; 3 years; \$14,600.
- WASHINGTON UNIVERSITY**, St. Louis, Mo.; J. P. Hurley, Department of Physics; *Photon Splitting by the Coulomb Field of the Nucleus*; 2 years; \$17,200.
- WESLEYAN UNIVERSITY**, Middletown, Conn.; F. I. Boley, Department of Physics; *Low Energy Inelastic Neutron Scattering*; 2 years; \$14,900.
- WILLAMETTE UNIVERSITY**, Salem, Oreg.; Robert L. Purbrick, Department of Physics; *Vibrational Constants of Diatomic Molecules*; 3 years; \$4,000.
- YALE UNIVERSITY**, New Haven, Conn.; *Experimental Investigation of Liquid Helium*; 2 years; \$30,600.

Psychobiology

- THE AMERICAN MUSEUM OF NATURAL HISTORY**, New York, N. Y.; T. C. Schneirla, Department of Animal Behavior; *Behavior Patterns in Lower Mammals*; 1 year; \$8,900.
- UNIVERSITY OF ARKANSAS**, Fayetteville, Ark.; Merrell E. Thompson, Department of Psychology; *Stimulus Generalization and Inhibition*; 2 years; \$8,400.

- BOSTON UNIVERSITY, Boston, Mass.; J. M. Harrison, Department of Psychology; *Neurophysiology and Behavior*; 3 years; \$22,100.
- BRANDEIS UNIVERSITY, Waltham, Mass.; Richard Held, Department of Psychology; *Visual-Motor Coordination*; 2 years; \$10,700.
- BROWN UNIVERSITY, Providence, R. I.; J. W. Kling, Department of Psychology; *An Analysis of Factors Influencing Response Strength*; 1 year; \$5,100.
- BROWN UNIVERSITY, Providence, R. I.; Carl Pfaffman, Department of Psychology; *Psychophysiological Studies of Taste and Olfaction*; 5 years; \$29,800.
- BRYN MAWR COLLEGE, Bryn Mawr, Pa.; Donald R. Brown, Department of Psychology; *Research and Training in Experimental Psychology*; 2 years; \$11,200.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; David Krech, Department of Psychology; *Brain Chemistry and Behavior*; 3 years; \$38,000.
- CARLETON COLLEGE, Northfield, Minn.; Sumner C. Hayward, Department of Psychology; *Modification of Innate Behavior*, 2 years; \$8,000.
- CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Lee W. Gregg, Department of Psychology; *Distribution of Muscle Action Potentials During Learning*; 2 years; \$8,500.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; Howard F. Hunt and Irving T. Diamond, Department of Psychology; *Effect of Rhinencephalic Ablations on Behavior*; 2 years; \$15,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; Fred A. Mettler, Department of Anatomy, College of Physicians and Surgeons; *Function of the Striatum*; 2 years; \$15,200.
- CORNELL UNIVERSITY, Ithaca, N. Y.; Howard E. Evans, Department of Entomology; *Behavior Patterns of Solitary Hymenoptera*; 2 years; \$7,200.
- DUKE UNIVERSITY, Durham, N. C.; Gregory A. Kimble, Department of Psychology; *Research in Eyelid Conditioning*; 2 years; \$10,200.
- DUKE UNIVERSITY, Durham, N. C.; Kellogg V. Wilson, Department of Psychology; *Multidimensional Stimulus Scaling*; 2 years; \$8,800.
- FISK UNIVERSITY, Nashville, Tenn.; S. Oliver Roberts, Department of Psychology; *Research and Training in Experimental Psychology*; 2 years; \$10,000.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Lloyd M. Beidler, Department of Physiology; *Research on Chemoreception*; 2 years; \$9,900.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Daniel R. Kenshalo, Department of Psychology; *An Analysis of Tactile Stimuli*; 1 year; \$5,100.
- HARVARD UNIVERSITY, Cambridge, Mass.; Solomon E. Asch, Department of Social Relations; *Studies in Cognition*; 1 year; \$7,500.
- HARVARD UNIVERSITY, Cambridge, Mass.; Ernst Mayr, Museum of Comparative Zoology; *Research on the Behavior of Neotropical Laridae*; 2 years; \$11,500.
- HARVARD UNIVERSITY, Cambridge, Mass.; Philip Teitelbaum, Department of Psychology; *Effect of Hypothalamic Lesions on Behavior*; 18 months; \$12,000.
- ILLINOIS COLLEGE, Jacksonville, Ill.; Nicholas E. Collias, Department of Biology; *Behavior in Ploceidae*; 1 year; \$14,500.
- INDIANA UNIVERSITY, Bloomington, Ind.; Lloyd R. Peterson, Department of Psychology; *Stimulus Variables in Forgetting*; 1 year; \$4,400.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Don Lewis, Department of Psychology; *Research on Perceptual-Motor Behavior*; 2 years; \$13,500.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Curt P. Richter, Psychobiological Laboratory, Medical School; *Research in Electrophysiology*; 5 years; \$62,100.
- KENT STATE UNIVERSITY, Kent, Ohio; Charles C. Perkins, Jr. Department of Psychology; *Study of Stimulus Generalization*; 2 years; \$10,000.
- MCGILL UNIVERSITY, Montreal, Canada; Herbert Jasper and D. O. Hebb, Neurological Institute and Department of Psychology; *Neuro-Psychological Studies*; 2 years; \$16,700.

- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Frederick H. Test, Department of Zoology; *An Experimental Analysis of Territorial Behavior*; 1 year; \$5,800.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Edward L. Walker, Department of Psychology; *Comparison of Conditioning Techniques*; 2 years; \$10,900.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Eugene S. Gollin, Institute of Child Welfare; *Department of Visual and Tactual Recognition*; 1 year; \$5,300.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; Melvin H. Marx, Department of Psychology; *Experimental Analysis of Food Hoarding Behavior*; 1 year; \$7,000.
- MONTANA STATE UNIVERSITY, Missoula, Mont.; James H. Straughan, Department of Psychology; *Mathematical Analysis of Human Learning*; 1 year; \$3,500.
- MOUNT HOLYOKE COLLEGE, South Hadley, Mass.; T. W. Reese, Department of Psychology; *Effects of Secondary Reinforcing Agents on Extinction*; 15 months; \$8,600.
- NEW MEXICO A. AND M. COLLEGE, State College, N. Mex.; Merrell T. Thompson, Department of Psychology; *Stimulus Generalization and Inhibition*; 2 years; \$8,400.
- THE RESEARCH FOUNDATION OF THE STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Jack Richardson, Department of Psychology, Harpur College, Endicott, New York; *Role of Similarity in Concept Formation*; 2 years; \$3,800.
- NEW YORK UNIVERSITY, New York, N. Y.; Howard H. Kendler and Tracy S. Kendler, Department of Psychology; *Research on Problem-Solving Behavior*; 3 years; \$22,600.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; A. Leonard Diamond, Department of Psychology; *The Psychophysiology of Vision: Simultaneous Brightness Contrast*; 3 years; \$19,200.
- OHIO STATE UNIVERSITY, Columbus, Ohio; Delos D. Wickens, Department of Psychology; *Discriminability Within Complex Stimuli*; 2 years; \$9,500.
- OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Harry P. Bahrck, Department of Psychology; *Factors Influencing Psychomotor Control*; 2 years; \$10,000.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; John F. Hall and Alec J. Slivinske, Department of Psychology; *Studies of Stimulus Discriminability*; 2 years; \$11,900.
- UNIVERSITY OF PUERTO RICO, San Juan, P. R.; E. H. Hinman, School of Medicine; *Asphyxia Neonatorum Brain*; 1 year; \$1,600.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Arnold A. Gerall, Department of Psychology; *Conditioning of the Pupillary Response*; 1 year; \$6,600.
- RUTGERS UNIVERSITY, New Brunswick, N. J.; Daniel S. Lehrman, Department of Psychology; *Psychobiological Studies of Behavior*; 3 years; \$24,600.
- SAMUEL S. FELS RESEARCH INSTITUTE FOR THE STUDY OF HUMAN DEVELOPMENT, Yellow Springs, Ohio; William D. Thompson, Department of Psychophysiology; *Behavior Effects of Thiamine Deficiency*; 1 year; \$5,000.
- COLLEGES OF THE SENECA, HOBART AND WILLIAM SMITH COLLEGES, Geneva, N. Y.; Neil Bartlett, Department of Psychology; *Research and Training in Experimental Psychology*; 3 years; \$7,800.
- SOUTHERN ILLINOIS UNIVERSITY, Carbondale, Ill.; Israel Goldiamond, Department of Psychology; *Development of Psychophysical Techniques*; 1 year; \$5,900.
- SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; Alvin J. North, Department of Psychology; *Studies of Discrimination Learning*; 2 years; \$10,200.
- STANFORD UNIVERSITY, Stanford, Calif.; Robert R. Sears, Department of Psychology; *Analysis of Motivation Measures*; 1 year; \$3,900.
- UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Ernest Furchtgott, Department of Psychology; *Magnitude of Reward and Acquisition*; 1 year; \$2,000.

- THE TRAINING SCHOOL AT VINELAND, NEW JERSEY, Vineland, N. J.; Johs. Clausen, Laboratory for Experimental and Physiological Psychology; *Psychophysical Problems in Electrically Induced Visual Sensations*; 2 years; \$11,900.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; James L. Morey, Department of Psychology; *Research on Latent Learning*; 1 year; \$5,400.
- UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Bennet B. Murdock, Jr., Department of Psychology; *Research on Transfer of Training*; 2 years; \$10,000.
- STATE COLLEGE OF WASHINGTON, Pullman, Wash.; David Ehrenfreund, Department of Psychology; *Research on Motivation*; 1 year; \$6,900.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Sidney W. Bijou, Department of Psychology; *Motivation and Learning in Children*; 2 years; \$11,000.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Karl U. Smith, Department of Psychology; *The Role of Perception in Patterned Motion*; 3 years; \$17,700.
- YALE UNIVERSITY, New Haven, Conn.; Paul D. MacLean and John P. Flynn, Department of Psychiatry; *Effects of Hippocampal Seizures on Conditioned Behavior*; 3 years; \$35,000.
- YALE UNIVERSITY, New Haven, Conn.; Seth K. Sharpless, Department of Psychology; *Effects of Biochemical Agents on Behavior*; 1 year; \$6,500.

Regulatory Biology

- UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; Robert L. Wixom and Paul L. Day, Department of Biochemistry; *Biosynthesis of Amino Acids from Carbohydrate*; 3 years; \$11,900.
- BRYN MAWR COLLEGE, Bryn Mawr, Pa.; Robert L. Conner, Department of Biology; *Steroids in Ciliate Protozoa*; 3 years; \$14,600.
- THE UNIVERSITY OF BUFFALO, Buffalo, N. Y.; David P. Hackett, Department of Biology; *Mechanisms of Respiration and Energy Supply in Plant Tissues*; 3 years; \$17,750.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; George C. Latices, Division of Biology; *Nature and Function of Coexisting Respiratory Systems of Plant Tubers*; 3 years; \$22,900.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; C. A. Barraclough, Department of Anatomy, Los Angeles, Calif.; *Mechanisms Involved in Hormone-Induced Sterility in Mice*; 2 years; \$11,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Thomas W. James and Theodore L. Jahn, Department of Zoology, Los Angeles, Calif.; *Metabolism in Relation to Cellular Division*; 2 years; \$20,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Barbara B. Oakeson, Department of Biological Sciences, Santa Barbara, Calif.; *Comparative Thyroid Histology in Resident and Migratory Birds*; 2 years; \$8,150.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Robert C. Stebbins and Richard M. Eakin, Museum of Vertebrate Zoology, and Department of Zoology; *Structure and Function of the Parietal Eye in Reptiles*; 1 year; \$5,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; P. K. Stumpf, Department of Plant Biochemistry; *Enzymatic Mechanisms Participating in Fat Metabolism of Higher Plants*; 3 years; \$30,000.
- CENTRE NATIONAL DE TRANSFUSION SANGUINE, 6 Rue Alexandre-Cabanel, Paris, France; Alfred L. Copley; *Role of Endothelium in Fibrin Formation, Platelet Agglutination and Production of Vascular Purpura*; 2 years; \$9,200.
- COLUMBIA UNIVERSITY, New York, N. Y.; Herbert Elftman, Department of Anatomy; *Cytochemistry of the Anterior Pituitary Gland*; 2 years; \$10,900.

- COLUMBIA UNIVERSITY, New York, N. Y.; Harry Grundfest, Department of Neurology; *Fundamental Mechanisms of Bioelectric Activity*; 3 years; \$45,000.
- COLUMBIA UNIVERSITY, New York, N. Y.; Beatrice C. Seegal, Department of Microbiology; *Immunological Mechanisms in Experimental Nephritis*; 2 years; \$24,500.
- CORNELL UNIVERSITY, Ithaca, N. Y.; William A. Wimsatt, Department of Zoology; *Physiology of Hibernation and Absorption in the Bat*; 3 years; \$19,650.
- EMORY UNIVERSITY, Emory University, Ga.; Chauncey G. Goodchild, Department of Biology; *Role of Mucosa and Luminal Contents in Nutrition of Intestinal Parasites*; 2 years; \$10,800.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; H. Arliss Denyes, Department of Physiology; *Function of Cortical Tubular Cells in Acclimation and Hibernation*; 2 years; \$7,000.
- UNIVERSITY OF HAWAII, Honolulu, T. H.; Yoshinori Tanada, Department of Zoology and Entomology; *Synergism Among Insect Viruses*; 2 years; \$9,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; R. H. Hageman, Department of Agronomy; *Heterosis in Corn in Relation to the Composition, Quantity, and Efficiency of Enzymes*; 2 years; \$10,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; C. Ladd Prosser, Department of Physiology; *Conduction in Non-Striated Muscle*; 3 years; \$16,000.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; R. S. Wolfe, Department of Bacteriology; *Mechanisms of Carbon Dioxide Fixation in Chemo-Autotrophic Bacteria*; 3 years; \$19,000.
- INSTITUT NATIONAL D'HYGIENE, Paris, France; Alfred L. Copley; *Role of the Capillary Endothelium in Fibrin Formation and Platelet Agglutination*; 1 year; \$4,600.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Emil Witschi, Department of Zoology; *Comparative Endocrine Studies on the Vertebrate Hypophysis*; 3 years; \$30,000.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Ralph D. DeMoss, Department of Biology, McCollum-Pratt Institute; *Bacterial Pigments*; 2 years; \$11,300.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Nathan O. Kaplan, McCollum-Pratt Institute and Abraham G. Osler, Department of Microbiology; *Cellular Inhibitory Factors Regulating Enzymatic Activity*; 2 years; \$24,500.
- JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Gilbert H. Mudge, Department of Pharmacology and Experimental Therapeutics, School of Medicine; *Cellular Mechanism of Electrolyte Transport in the Kidney*; 3 years; \$23,900.
- KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; J. G. Rodriguez, Agricultural Experiment Station, University of Kentucky; *The Nutrition of Plant-Feeding Mites*; 2 years; \$10,250.
- LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Howard J. Saz, Department of Pharmacology, School of Medicine, New Orleans, La.; *Intermediary Carbohydrate Metabolism of Ascaris Lumbricoides*; 5 years; \$24,400.
- MICHAEL REESE HOSPITAL, Chicago, Ill.; Rachmiel Levine and Maurice S. Goldstein, Department of Metabolic and Endocrine Research; *Hepatic and Muscle Factors Concerned with Integration of Metabolic Events*; 3 years; \$28,000.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Wilbur B. Quay, Department of Anatomy; *Structure and Function of the Mammalian Pineal Body*; 2 years; \$8,600.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Arnold Lazarow, Department of Anatomy; *Isolated Pancreatic Islet Tissue of the Toadfish*; 2 years; \$16,600.
- UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Grover C. Stephens, Department of Zoology; *Crustacean Endocrinology*; 3 years; \$14,400.
- UNIVERSITY OF MISSOURI, Columbia, Mo.; D. S. Van Fleet, Department of Botany; *Cell Division and Differentiation in Plants*; 2 years; \$10,900.

- CITY COLLEGE OF NEW YORK, New York, N. Y.; William Etkin, Department of Biology; *Inter-relationships of the Pars Intermedia, the Hypothalamus, and the Adrenal Cortex*; 2 years; \$8,000.
- NEW YORK UNIVERSITY, New York, N. Y.; Bernard D. Davis, Department of Pharmacology, College of Medicine; *Bacterial Growth Factors and Protein Synthesis*; 2 years, 6 months; \$15,250.
- NEW YORK UNIVERSITY, New York, N. Y.; Henry I. Hirshfield, Department of Biology, Washington Square College; *Photolytic Pigment in Cell Growth and Differentiation*; 2 years; \$10,250.
- NEW YORK UNIVERSITY, New York, N. Y.; W. N. Hubbard, Jr., New York University College of Medicine; *Short-Term Research by Medical Students*; 3 years; \$10,800.
- RESEARCH FOUNDATION OF THE STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; James B. Hamilton, Department of Anatomy, College of Medicine at New York, New York; *Mechanism of Integumentary Control in Experimental Animals*; 2 years; \$10,000.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; C. L. Turner, Department of Biology; *Effects of ACTH and Cortisone upon Regeneration of Tissues of Vertebrates*; 2 years; \$9,000.
- UNIVERSITY OF OREGON, Portland, Oreg.; D. W. E. Baird, Medical School; *Short-Term Research by Medical Students*; 3 years; \$9,750.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Edward C. Cantino, Department of Botany; *Metabolic and Morphogenetic Relationships and Light-Induced Growth in Fungi*; 3 years; \$14,700.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Eugene I. Rosanoff, Department of Microbiology, School of Veterinary Medicine; *Tissue Culture Studies on Brucellosis*; 2 years; \$9,600.
- PRINCETON UNIVERSITY, Princeton, N. J.; Colin S. Pittendrigh, Department of Biology; *Physiological Basis of Time Measurements (Clocks) in Organisms*; 3 years; \$19,800.
- PRINCETON UNIVERSITY, Princeton, N. J.; W. W. Swingle, Department of Biology; *Biological Properties of Adreno-Cortical Steroids*; 3 years; \$17,250.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Donald G. Anderson, School of Medicine and Dentistry; *Summer Research by Medical Students*; 3 years; \$9,900.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Alworth D. Larson, Department of Bacteriology; *Factors Involved in the Utilization of Valine Isomers by Bacteria*; 2 years; \$4,000.
- RUTGERS UNIVERSITY, New Brunswick, N. J.; Werner Braun, Institute of Microbiology; *Selective Bacterial Inhibition by Metabolic Factors*; 3 years; \$25,900.
- RUTGERS UNIVERSITY, New Brunswick, N. J.; James B. Durand, Department of Zoology; *Relation of Neurosecretory Activity to the Molt Cycle of the Crayfish*; 1 year; \$2,300.
- ST. FRANCIS HOSPITAL, Wichita, Kans.; Richard F. Straw, Biochemistry Department; *Identification of Estrogens and Related Substances*; 3 years; \$5,800.
- ST. JOHN'S UNIVERSITY, Brooklyn, N. Y.; Daniel M. Lilly, Department of Biology; *Nutritional Factors in the Growth of Hypotrichous Ciliates*; 2 years; \$11,050.
- UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; Keatha K. Krueger, Department of Biochemistry, School of Medicine; *Metabolism of Organisms in the Genus Neisseria*; 2 years; \$5,400.
- SOUTHERN ILLINOIS UNIVERSITY, Carbondale, Ill.; Frank J. Finamore, Department of Physiology; *Nucleic Acid Metabolism During the Early Developmental Stages of Rana Pipiens*; 2 years; \$8,350.

- SYRACUSE UNIVERSITY, Syracuse, N. Y.; Bernard S. Strauss, Department of Zoology; *Biochemical Events During Morphogenesis of Fungi*; 3 years; \$12,000.
- TEMPLE UNIVERSITY, Philadelphia, Pa.; John M. Ward, Department of Biology; *Biochemical Aspects of Morphogenesis of Physarum Polycephalum*; 2 years; \$9,800.
- UNIVERSITY OF TENNESSEE, Memphis, Tenn.; James S. Davis, Division of Anatomy; *Effects of Accessory Nutritional Factors on the Nucleic Acids of Uterine Tissue*; 2 years; \$1,000.
- TRINITY UNIVERSITY, San Antonio, Tex.; Walton B. Geiger; *Immunological Relationships in Smooth Muscle*; 3 years; \$27,200.
- TULANE UNIVERSITY, New Orleans, La.; Jerome O. Krivanek, Department of Zoology, Newcomb College; *Histochemistry of the Developing Slime Mold, Dictyostelium Discoideum Raper*; 2 years; \$8,100.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; Philip B. Price, College of Medicine; *Short-Term Research by Medical Students*; 3 years; \$7,500.
- VANDERBILT UNIVERSITY, Nashville, Tenn.; Charles R. Park, Department of Physiology; *Mechanisms of Glucose Transfer Through Cell Membranes*; 2 years; \$17,450.
- UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Donald B. Johnstone, Department of Microbiology; *Lysine Synthesis by Azotobacter*; 2 years; \$8,600.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Donald J. Hanahan, Department of Biochemistry, School of Medicine; *Biochemistry of Phospholipides*; 3 years; \$23,400.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; Bastiaan J. D. Meeuse, Department of Botany; *Nature and Metabolic Role of Moss Oxalic Acid Oxidase*; 2 years; \$9,850.
- WASHINGTON UNIVERSITY, St. Louis, Mo.; Robert K. Crane, Department of Biological Chemistry; *Utilization of Hexoses by Animal Cells*; 3 years; \$20,100.
- WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; John L. Caughey, Jr., School of Medicine; *Short-Term Research by Medical Students*; 3 years; \$8,100.
- WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; M. Neil Macintyre, Department of Anatomy; *Physiological Induction of Sex Differentiation in Mammals*; 3 years; \$19,000.
- WESTMINSTER COLLEGE, Fulton, Mo.; C. D. Day and L. M. Elrod, Department of Biology; *Metabolic Mechanisms Related to Growth and Respiration of Cells*; 2 years; \$2,000.
- WILLIAMS COLLEGE, Williamstown, Mass.; Allyn J. Waterman, Department of Biology; *Functional Differentiation of the Mammalian Thyroid Gland*; 3 years; \$8,800.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Paul J. Allen, Department of Botany; *Biological Mechanisms of Development of Obligate Parasites*; 3 years; \$28,600.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; Dexter S. Goldman, Institute for Enzyme Research; *Fatty Acid Metabolism of the Tubercle Bacillus*; 3 years; \$14,900.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; J. T. Medler and S. D. Beck, Department of Entomology; *Nutrition of Plant-Sucking Hemiptera and Homoptera*; 2 years; \$10,750.
- YALE UNIVERSITY, New Haven, Conn.; Morris Foster, Osborn Zoological Laboratory; *Enzymatic Studies of Mammalian Melanin Formation*; 2 years; \$7,050.
- YALE UNIVERSITY, New Haven, Conn.; Arthur W. Galston, Department of Plant Science; *Light-Controlled Growth Reactions*; 30 months; \$17,000.
- YALE UNIVERSITY, New Haven, Conn.; William W. Winternitz, Department of Psychology, School of Medicine; *Mechanism of Adrenocortical Hormone Action on Carbohydrate Metabolism*; 2 years; \$15,200.

- YESHIVA UNIVERSITY, New York, N. Y.; Henry D. Hoberman, Department of Biochemistry; *Endocrine Regulation of Amino Acid Catabolism*; 2 years; \$15,200.
- YESHIVA UNIVERSITY, New York, N. Y.; Marcus D. Kogel, Albert Einstein College of Medicine; *Short-Term Research by Medical Students*; 3 years; \$6,000.
- YESHIVA UNIVERSITY, New York, N. Y.; Abraham White, Department of Biochemistry, Albert Einstein College of Medicine; *Mechanism of the Effects of Adrenal Cortical Steroids*; 3 years; \$30,000.

Sociophysical Sciences

- UNIVERSITY OF CHICAGO, Chicago, Ill.; T. W. Schultz, Department of Economics; *An Econometric Model of the Development and Acceptance of a New Technology*; 2 years; \$13,000.
- HARVARD UNIVERSITY, Cambridge, Mass.; I. Bernard Cohen, Committee on Higher Degrees in History of Science and Learning; *Development of Physical Science*; 3 years; \$7,400.
- HARVARD UNIVERSITY, Cambridge, Mass.; Frederick Mosteller, Laboratory of Social Relations; *Experimental and Mathematical Studies of Choice Behavior*; 2 years; \$17,500.
- YALE UNIVERSITY, New Haven, Conn.; Henry Morgenau; Department of Physics; *The Meaning of Measurement of Quantum Mechanics*; 2 years; \$16,500.

Systematic Biology

- ALLEGHENY COLLEGE, Meadville, Pa.; David J. Rogers, Department of Biology; *Variation in Manihot Utilissima*; 2 years; \$8,000.
- ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, Philadelphia, Pa.; Ruth Patrick; *Fresh-Water Diatoms of the United States*; 2 years; \$14,500.
- ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, Philadelphia, Pa.; James A. G. Rehn, Department of Insects; *Orthoptera of North America*; 3 years; \$36,000.
- AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Mont A. Cazier, Department of Insects and Spiders; *Revision of the Genus Diplotaxis*; 1 year; \$2,500.
- AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Nicholas S. Obraztsov, Department of Insects and Spiders; *Revision of North American Tortricidae*; 2 years; \$10,200.
- BARNARD COLLEGE, New York, N. Y.; Donald D. Ritchie, Department of Botany; *Panamanian Marine Fungi*; 1 year; \$2,400.
- BERNICE P. BISHOP MUSEUM, Honolulu, T. H.; J. Linsley Gressitt, Department of Entomology; *Zoogeography of Pacific Insects*; 3 years; \$23,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Lincoln Constance, Department of Botany; *Taxonomy of South American Umbelliferae*; 3 years; \$6,800.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Adriance S. Foster, Department of Botany; *Study of Plants of New Caledonia and Australia*; 1 year; \$3,000.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Irwin M. Newell, Division of Life Sciences; Riverside, California; *Correlation of Larvae and Adults of the Polytrichous Trombidiform Mites*; 2 years; \$7,600.
- UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Margaret Fulford, Department of Botany; *Leafy Hepaticae of Tropical America*; 3 years; \$15,000.
- COLORADO A. AND M. COLLEGE, Fort Collins, Colo.; Tyler A. Woolley, Department of Zoology; *Investigation of Colorado Oribatid Mites*; 2 years; \$2,500.
- CORNELL UNIVERSITY, Ithaca, N. Y.; Charles G. Sibley, Department of Conservation; *Systematic and Evolutionary Study of Interspecific Hybridization in Birds*; 3 years; \$15,000.

- DUKE UNIVERSITY, Durham, N. C.; Lewis E. Anderson, Department of Botany; *Cytotaxonomy of North American Mosses*; 3 years; \$14,000.
- DUKE UNIVERSITY, Durham, N. C.; Terry W. Johnson, Jr., Department of Botany; *Marine Fungi: Taxonomy and Seasonal Fluctuation*; 3 years; \$7,500.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Ruth S. Breen, Department of Botany; *An Illustrated Guide to the Mosses of Florida*; 2 years; \$7,800.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Robert K. Godfrey, Department of Botany; *Vascular Plants of Aquatic and Marsh Habitats of Western Florida*; 2 years; \$7,200.
- FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Arthur W. Ziegler, Department of Botany; *Water Molds of Florida*; 2 years; \$5,000.
- FUNDACIÓN MIGUEL LILLO; Tucumán, Argentina; Rolf Singer, Botanical Department; *Basidiomycete Flora of South America*; 1 year; \$4,500.
- GRINNELL COLLEGE, Grinnell, Iowa; Norman H. Russell, Jr., Department of Biology; *Taxonomy of the Acaulescent Species of Viola*; 2 years; \$3,100.
- UNIVERSITY OF GRONINGEN, Groningen, Netherlands; R. van der Wijk, Department of Systematic Biology; *New Index Muscorum*; 3 years; \$5,100.
- HARVARD UNIVERSITY, Cambridge, Mass.; I. MacKenzie Lamb, Farlow Herbarium; *New Index of Lichens*; 2 years; \$3,900.
- HARVARD UNIVERSITY, Cambridge, Mass.; Reed C. Rollins and Carroll E. Wood, Jr., Gray Herbarium and Arnold Arboretum; *Flora of Southeastern United States*; 3 years; \$24,300.
- HARVARD UNIVERSITY, Cambridge, Mass.; Richard Evans Schultes, Department of Botany; *Floristic Studies of the Northwest Amazon*; 3 years; \$5,000.
- HARVARD UNIVERSITY, Cambridge, Mass.; Charles Schweinfurth, Orchid Herbarium of Oakes Ames; *Orchidaceae of Guayana Highlands*; 3 years; \$4,440.
- UNIVERSITY OF HAWAII, Honolulu, T. H.; Harold St. John, Department of Botany; *Pandanus of the Pacific Islands*; 3 years; \$12,000.
- UNIVERSITY OF IDAHO, Moscow, Idaho; Henry A. Imshaug, Department of Biological Sciences; *Alpine Lichens of Western North America*; 1 year; \$2,300.
- UNIVERSITY OF ILLINOIS, Urbana, Ill.; Paul C. Silva, Department of Botany; *Taxonomic and Phytogeographic Studies of the Marine Algae of California*; 3 years; \$4,100.
- INDIANA UNIVERSITY, Bloomington, Ind.; Charles B. Heiser, Department of Botany; *Variation and Speciation in Sunflowers*; 3 years; \$10,000.
- IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; Martin L. Grant, Department of Science; *Society Islands Flora*; 2 years; \$3,200.
- STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Robert F. Thorne, Department of Botany; *Vascular Plants of Iowa*; 2 years; \$7,000.
- KANSAS STATE COLLEGE, Manhattan, Kans.; Thomas H. Lord, Department of Bacteriology, and Merle F. Hansen, Department of Zoology; *Microflora of the Digestive Tract of Parasitic Nematodes*; 2 years; \$7,000.
- KNOX COLLEGE, Galesburg, Ill.; George H. Ward, Department of Biology; *The Artemisia Tridentata Complex*; 2 years; \$5,000.
- UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Charles P. Alexander, Department of Entomology; *Crane-Flies of Western North America*; 2 years; \$2,400.
- UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Dana P. Snyder, Department of Zoology; *Intraspecific Variation in Mammals*; 2 years; \$3,000.
- MICHIGAN STATE COLLEGE, East Lansing, Mich.; G. W. Prescott, Department of Botany; *Desmids of North America, Their Ecology and Taxonomy*; 3 years; \$7,700.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; William R. Taylor, Department of Botany; *Manual of the Marine Algae of the Arctic, Temperate, and Tropical Coast of North, Central, and Northern South America*; 3 years; \$11,500.

- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Josselyn van Tyne, Museum of Zoology; *Trachea and Syrinx of Ducks: Variation and Possible Taxonomic Significance*; 2 years; \$10,600.
- UNIVERSITY OF MISSISSIPPI, University, Miss.; Frank M. Hull, Department of Biology; *Taxonomy and Phylogeny of Diptera*; 2 years; \$8,600.
- UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; Dwight D. Miller, Department of Zoology; *Taxonomic Study of Wild Species of Drosophila*; 2 years; \$6,000.
- UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; Hilliard Pivnick, Department of Bacteriology; *Studies of Bacteria from Soluble Oil Emulsions*; 2 years; \$4,500.
- UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; Marian H. Pettibone, Department of Zoology; *Polychaetous Annelids of New England*; 2 years; \$12,400.
- NEW YORK BOTANICAL GARDEN, New York, N. Y.; Otto Degener, Collaborator in Hawaiian Botany; *Botanical Exploration of Hawaiian Islands*; 3 years; \$12,000.
- NEW YORK BOTANICAL GARDEN, New York, N. Y.; Bassett Maguire, Curator; *Flora of the Guayana Highland*; 2 years; \$13,000.
- UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Ritchie Bell, Department of Botany; *Cytological Investigation of the Umbelliferae of North America*; 4 years; \$7,900.
- NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; Theodore B. Mitchell, Division of Biology; *Native Hymenoptera of Eastern United States*; 2 years; \$11,000.
- NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; C. F. Smith, Department of Entomology; *Catalogue of the Homoptera of the World*; 2 years; \$12,000.
- NORTH DAKOTA AGRICULTURAL COLLEGE, Fargo, N. Dak.; D. R. Moir, Department of Botany and Plant Pathology; *Floristic Survey of Northwestern Ontario*; 2 years; \$4,300.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; Lewis H. Tiffany, Department of Botany; *Effect of Metabolites on Polymorphism of Some Chlorococcaceae*; 1 year; \$7,000.
- OREGON STATE COLLEGE, Corvallis, Oreg.; Herman A. Scullen, Department of Entomology; *Taxonomic Studies of the Wasp Tribe Cercerini*; 2 years \$2,500.
- UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; John M. Fogg, Jr., Department of Botany; *Bibliography of the Flowering Plants of Mexico*; 2 years; \$6,500.
- UNIVERSITY OF RHODE ISLAND, Kingston, R. I.; Richard D. Wood, Department of Botany; *Revision of Characae*; 1 year; \$5,300.
- THE ROCKY MOUNTAIN BIOLOGICAL LABORATORY, Crested Butte, Colo.; Herbert W. Levi and Lorna R. Levi; *Survey of Spiders of Central and Southern Colorado Mountains*; 2 years; \$2,000.
- SMITHSONIAN INSTITUTION, Washington, D. C.; Jose Cuatrecasas, Department of Botany; *Taxonomic Study of the Phanerogams of Colombia*; 3 years; \$24,000.
- SMITHSONIAN INSTITUTION, Washington, D. C.; Alfred R. Loeblich, Jr.; Associate Curator and Helen T. Loeblich; *Recent Foraminifera from Ifaluk Atoll*; 2 years; \$9,000.
- SMITHSONIAN INSTITUTION, Washington, D. C.; Lyman B. Smith, Department of Botany; *Botanical Studies in Southeastern Brazil*; 1 year; \$5,400.
- SMITHSONIAN INSTITUTION, Washington, D. C.; Mildred S. Wilson, Anchorage, Alaska; *Monograph of Fresh-Water Calanoid Copepods*; 5 years; \$9,200.
- UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; John S. Garth, Department of Biology; *Revision of Pacific American Porcellanidae*; 2 years; \$10,300.
- UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; John L. Mohr, Department of Biology; *Revision of Cyamidae (Crustacea: Amphipoda)*; 1 year; \$2,000.
- SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; Lloyd H. Shinnars, Director of the Herbarium; *Flora of the Gulf Southwest*; 5 years; \$11,000.

- STANFORD UNIVERSITY, Stanford, Calif.; William C. Steere, Department of Biological Sciences; *Arctic American Mosses*; 3 years; \$13,800.
- SWARTHMORE COLLEGE, Swarthmore, Pa.; Neal A. Weber, Department of Biology; *Ant Fungi and Ant Secretions*; 1 year; \$5,000.
- UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Arthur Charles Cole, Jr., Department of Entomology; *Revisionary Studies of the Ant Genus Pogonomyrmex*; 2 years; \$6,000.
- UNIVERSITY OF TEXAS, Austin, Tex.; W. Frank Blair, Department of Zoology; *Interbreeding of Amphibian Populations*; 2 years; \$11,400.
- UNIVERSITY OF TEXAS, Austin, Tex.; Clark Hubbs, Department of Zoology; *Interbreeding of Fish Populations*; 2 years; \$8,100.
- TULANE UNIVERSITY, New Orleans, La.; George H. Penn, Department of Zoology; *Speciation in Crawfish*; 1 year; \$3,900.
- TUSCULUM COLLEGE, Greeneville, Tenn.; Arnold Van Pelt, Department of Biology; *Altitudinal Distribution of Ants in Southern Blue Ridge*; 1 year; \$1,200.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; William H. Behle, Department of General Biology; *Avifauna of Utah*; 1 year; \$3,300.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; George F. Edmunds, Jr., Department of Zoology; *Higher Classification of Ephemeroptera*; 2 years; \$2,400.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; C. Leo Hitchcock, Department of Botany; *Vascular Plants of the Pacific Northwest*; 3 years; \$5,900.
- UNIVERSITY OF WYOMING, Laramie, Wyo.; Glenn A. Noble; *Intestinal Amoebae in Mammals*; 1 year; \$1,800.
- YALE UNIVERSITY, New Haven, Conn.; William L. Stern, School of Forestry; *Anatomy of Woody Plants of the Florida Keys*; 2 years; \$3,500.
- YALE UNIVERSITY, New Haven, Conn.; Oswald Tippo, Plant Science Department; *Comparative Anatomy and Phylogeny of Related Orders in Plants*; 2 years; \$10,600.

General

- AMERICAN PHYSIOLOGICAL SOCIETY, MEDICAL COLLEGE OF GEORGIA, Augusta, Ga.; C. Ladd Prosser, Project Director; *Workshops for Teachers of Physiology in Undergraduate Colleges*; 3 years; \$23,550.
- AMERICAN SOCIETY FOR ENGINEERING EDUCATION, Urbana, Ill.; Eric A. Walker, Chairman of the Survey; *Survey of Engineering Colleges Research Capabilities*; 18 months; \$40,000.
- BROWN UNIVERSITY, Providence, R. I.; William Prager, Chairman, Physical Sciences Council; *Summer Research for High-School Teachers*; 3 months; \$7,000.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Frits W. Went, Division of Biology; *Research Facilities in Plant Physiology, Ecology, and Genetics, at the Earhart Plant Research Laboratory*; 3 years; \$75,000.
- UNIVERSITY OF CHICAGO, Chicago, Ill.; A. A. Albert, Chairman, Survey Committee; *Survey of Research Potential and Training in the Mathematical Sciences*; 9 months; \$5,000.
- UNIVERSITY OF COLORADO, Boulder, Colo.; H. J. Dodge, Department of Preventive Medicine; *Tissue Culture Techniques*; 3 years; \$15,000.
- HARVARD UNIVERSITY, Cambridge, Mass.; Donald R. Griffin, Chairman, Departmental Committee on Summer Research by Students; *Summer Research by Advanced Students in Biology*; 3 years; \$11,000.
- INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; John von Neumann, Committee Chairman; *A Study of University Computing Facilities*; 1 year; \$5,000.
- MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Philip B. Armstrong, Director; *Marine Biology*; 2 years; \$50,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; A. M. Sotckard, Director, Biological Station; *Research and Training at the University of Michigan Biological Station*; 2 years; \$13,800.

REED COLLEGE, Portland, Oreg.; Lewis H. Kleinholz, Department of Biology; *Basic Research by Advanced Biology Students*; 3 years; \$12,600.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Bruce D. Reynolds, Mountain Lake Biological Station; *Biological Research at Mountain Lake Biological Station*; 3 years; \$18,000.

CONTRACTS FOR BASIC RESEARCH IN SYNTHETIC RUBBER
AWARDED IN FISCAL YEAR 1956

University of Akron.....	\$45,000
Burke Research Company.....	150,000
Case Institute of Technology.....	40,000
University of Chicago.....	37,000
Cornell University (2).....	10,000
	51,000
University of Illinois.....	107,000
Massachusetts Institute of Technology.....	98,000
Mellon Institute of Industrial Research.....	84,000
University of Minnesota.....	74,000
National Bureau of Standards.....	194,000
	<hr/>
Total	890,000

OPERATION AND MANAGEMENT OF GOVERNMENT LABORATORIES,
AKRON, OHIO

University of Akron.....	\$950,000
	<hr/>
Grand Total	\$1,840,000

APPENDIX C

Grants Other Than Research

Conferences in Support of Science

- X AIR POLLUTION FOUNDATION Los Angeles, Calif.; *Conference on Chemical Reactions in Urban Atmospheres*; \$1,600.
- AMERICAN ACADEMY OF ARTS AND SCIENCES, Boston, Mass.; *Conference on Science and the Modern World View*; \$2,700.
- AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Gordon Research Conferences*; \$10,000.
- AMERICAN ASSOCIATION OF CLINICAL CHEMISTS, INC., LEBANON HOSPITAL, New York, N. Y.; *International Congress of Clinical Chemistry*; \$4,000.
- AMERICAN GEOGRAPHICAL SOCIETY, New York, N. Y.; *Third National Pollen Conference*; \$500.
- AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Conferences of United States Botanists Participating in Planning for the IXth International Botanical Congress*; \$1,000.
- AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Conference of United States Botanists Participating in Planning for the General Symposium to be Held at the 50th Anniversary of the Botanical Society*; \$900.
- AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *International Genetics Symposium*; \$25,800.
- AMERICAN PSYCHOLOGICAL ASSOCIATION, Washington, D. C.; *Conference on Evolution of Behavior*; \$9,500.
- AMERICAN SOCIETY OF HUMAN GENETICS, New York, N. Y.; *First International Congress of Human Genetics*; \$3,700.
- UNIVERSITY OF BUFFALO, Buffalo, N. Y.; *Conference: From Benzene to Graphite*; \$2,500.
- CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; *Application of Mathematics to Engineering*; \$9,500.
- UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Symposium on High Temperature*; \$3,000.
- CARNEGIE INSTITUTION OF WASHINGTON, Washington, D. C.; *Conference on Theoretical Geophysics*, \$9,500.
- DOMINION ASTROPHYSICAL OBSERVATORY, Victoria, British Columbia, Canada; *Conference on Binary Stars*; \$5,500.
- EARTHQUAKE ENGINEERING RESEARCH INSTITUTE, Pasadena, Calif.; *Conference on Earthquake Engineering*; \$8,000.
- THE INTERNATIONAL SOCIETY OF HEMATOLOGY, Boston, Mass.; *VIth International Congress of Hematology*; \$2,000.
- LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; *21st Cold Spring Harbor Symposium on Quantitative Biology*; \$6,500.
- UNIVERSITY OF MARYLAND, College Park, Md.; *Conference on Quantum Interaction of the Free Electron*; \$4,000.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Second International Congress on Acoustics*; \$25,000.

- MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; *A Symposium on Systematics*; \$1,000.
- MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; *Conference on Phylogeny and Its Application to Systematics*; \$1,500.
- NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Conference on Nuclear Geophysics*; \$7,300.
- NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *XIIth General Assembly of the International Scientific Radio Union*; \$12,000.
- NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *1956 Developmental Biology Workshop*; \$10,400.
- ROBERT S. PEABODY FOUNDATION FOR ARCHAEOLOGY, Andover, Mass.; *Conference on Radiocarbon Dating*; \$10,000.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Conference on Recording Sounds Produced by Animals*; \$4,400.
- RETINA FOUNDATION, Boston, Mass.; *Conference on Metabolism of Mucopolysaccharides*; \$3,200.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; *Seventh Annual Conference on High Energy Nuclear Physics*; \$10,000.
- SCIENCE SERVICE, Washington, D. C.; *Conference on Fellowships for Science Teachers in Universities and Colleges*; \$3,200.
- THE SOCIETY FOR THE STUDY OF DEVELOPMENT AND GROWTH, Cambridge, Mass.; *15th Growth Symposium*; \$2,700.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; *Conference on Identification of Creative Scientific Talent*; \$4,600.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; *Conference on Theoretical Physics*; \$15,000.
- UNIVERSITY OF WASHINGTON, Seattle, Wash.; *Conference on Microneurophysiology of the Synapse*; \$5,600.
- YALE UNIVERSITY, New Haven, Conn.; *Conference on Problems of Research Administration in University Physics Departments*; \$2,000.

Education in the Sciences

- ALABAMA COLLEGE, Montevallo, Ala.; *Summer Institute for High School Science Teachers*; 6 weeks; \$23,800.
- AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Traveling Science Libraries for Small High Schools*; 1 year; \$23,250.
- AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Conference on Science Training of Talented Students*; \$2,300.
- AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Conference on Teacher Education in Science*; \$2,800.
- AMERICAN CHEMICAL SOCIETY, Washington, D. C.; *Visiting Scientists in Chemistry*; 1 year; \$20,000.
- AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Visiting Biologists*; 1 year; \$18,120.
- AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Conferences on Teaching Materials for High School Physics*; \$3,450.
- AMERICAN SOCIETY FOR ENGINEERING EDUCATION, Urbana, Ill.; *Summer Institute in Nuclear Engineering*; 8 weeks; \$25,000.
- AMERICAN UNIVERSITY, Washington, D. C.; *Summer Institute for Secondary School Physical Science Teachers*; 6 weeks; \$28,800.
- UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; *Summer Institute in the Natural Sciences for High School Teachers*; 6 weeks; \$26,375.
- BOTANICAL SOCIETY OF AMERICA, Wellesley, Mass.; *Summer Institute for Botany Teachers from Small Colleges*; 6 weeks; \$31,400.

- DUKE UNIVERSITY, Durham, N. C.; *Radiation Biology for High School Teachers*; 5 weeks, \$8,750.
- HARVARD UNIVERSITY, Cambridge, Mass.; *Intensive Summer Program Devoted to Furthering the Scientific Education of High School Teachers with Particular Emphasis on the use of Radioactive Materials*; 8 weeks; \$14,000.
- INDIANA UNIVERSITY, Bloomington, Ind.; *Summer Institute for College Teachers of Chemistry*; 4 weeks; \$21,700.
- INDIANA UNIVERSITY, Bloomington, Ind.; *Summer Institute for High School Teachers of Biology*; 6 weeks; \$13,200.
- IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; *Summer Institute for High School Mathematics Teachers*; 6 weeks; \$29,500.
- MARSHALL COLLEGE, Huntington, W. Va.; *Summer Institute for High School Teachers of Physical Sciences*; 6 weeks; \$28,500.
- THE MATHEMATICAL ASSOCIATION OF AMERICA, Buffalo, N. Y., *Conference of the Committee on Mathematical Personnel and Education*; \$1,250.
- UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; *Summer Institute for Teachers of Collegiate Mathematics*; 8 weeks; \$38,700.
- MONTANA STATE COLLEGE, Bozeman, Mont.; *Summer Institute for Chemistry Teachers*; 5 weeks; \$26,000.
- NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Conference on the Education of Physicists*; \$2,693.
- NATIONAL MERIT SCHOLARSHIP CORPORATION, Evanston, Ill.; *Scholarship Aid, Identification of Academic Talent, and Motivation*; 5 years; \$125,000.
- UNIVERSITY OF NEW MEXICO, Albuquerque, N. M.; *New Mexico Science Teacher Training Program*; 8 weeks; \$14,000.
- OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, INC., Oak Ridge, Tenn.; *Program of Assistance to Science Teaching in Secondary Schools*; 1 year; \$76,320.
- OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, Oak Ridge, Tenn.; *Summer Institutes for Science Teachers*; 4 weeks; \$28,150.
- OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; *High School Science Teachers Supplementary Training Program*; 17 months; \$255,000.
- OREGON STATE COLLEGE, Corvallis, Oreg.; *Summer Institute for Chemistry College Teachers*; 4 weeks; \$21,600.
- PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Summer Institute for High School Teachers of Science*; 6 weeks; \$31,750.
- UNIVERSITY OF ROCHESTER, Rochester, N. Y.; *Summer Institute for High School Teachers of Physics*; 6 weeks; \$25,850.
- SCIENCE SERVICE, Washington, D. C.; *Science Clubs of America*; 2 years; \$40,000.
- SCIENCE SERVICE, Washington, D. C.; *Conference on Summer Institutes*; \$6,000.
- UNIVERSITY OF UTAH, Salt Lake City, Utah; *Summer Institute of Biology for College and High School Teachers*; 5 weeks; \$29,900.
- WESLEYAN UNIVERSITY, Middletown, Conn.; *Summer Institute for High School Teachers of Science*; 6 weeks; \$22,000.
- WILLIAMS COLLEGE, Williamstown, Mass.; *Summer Institute for High School and College Teachers of Mathematics*; 6 weeks; \$32,250.
- WISCONSIN STATE COLLEGE AT EAU CLAIRE, Eau Claire, Wis.; *Summer Institute of Astronomy for Faculty Members Engaged in Educating Science Teachers*; 4 weeks; \$20,750.
- UNIVERSITY OF WISCONSIN, Madison, Wis.; *High School Science Teachers Supplementary Training Program*; 18 months; \$249,700.
- UNIVERSITY OF WYOMING, Laramie, Wyo.; *Summer Institute for Physics Teachers*; 5 weeks; \$29,000.

National Committee for the Development of Scientists and Engineers

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington 25, D. C.; Howard L. Bevis, Chairman; *The National Committee for the Development of Scientists and Engineers*; 3 months; \$30,000.

Studies in Science

HARVARD UNIVERSITY, Cambridge, Mass.; *The Interrelationship of Industrial Research and Industrial Organization*; 18 months; \$12,000.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Research and Growth in the Textile Industry*; 1 year; \$7,920.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; *The Role and Limitations of Research in the Economic Growth of the Steel and Aluminum Industries, 1900-55*; 1 year; \$6,785.

PURDUE UNIVERSITY, Lafayette, Ind.; *The Contribution of Technological Change to Agricultural Output in the United States*; 1 year; \$8,309.

Scientific Manpower

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Maintaining The National Register of Scientific and Technical Personnel in the Field of Biology*; 1 year; \$20,650.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Maintaining the National Register of Scientific and Technical Personnel in the Field of Physics*; 1 year; \$10,000.

AMERICAN METEOROLOGICAL SOCIETY, Boston, Mass.; *National Register of Scientific and Technical Personnel in the Field of Meteorology*; 18 months; \$14,700.

AMERICAN PSYCHOLOGICAL ASSOCIATION, Washington, D. C.; *National Register of Scientific and Technical Personnel in Psychology*; 2 years; \$15,750.

ENGINEERS JOINT COUNCIL, New York, N. Y.; *Register of Key Engineers as a Section of the National Register of Scientific and Technical Personnel*; 1 year; \$11,000.

FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, Washington, D. C.; *National Register of Scientific and Technical Personnel in the Field of Biology*; 1 year; \$12,500.

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; *Scientific Manpower Survey-Soviet Satellites (Preliminary Study)*; 4 months; \$1,725.

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; *Doctorate Survey*; 2 years; \$22,350.

Attendance at International Meetings

Conference on the Physics of High Energy Particles, Moscow, Russia:

L. W. ALVAREZ, University of California, Berkeley, Calif.

K. A. BRUECKNER, Brookhaven National Laboratory, Upton, Long Island, N. Y.

O. CHAMBERLAIN, University of California, Berkeley, Calif.

M. GELL-MANN, California Institute of Technology, Pasadena, Calif.

R. E. MARSHAK, University of Rochester, Rochester, N. Y.

J. MARSHALL, University of Chicago, Chicago, Ill.

A. PAIS, Institute for Advanced Study, Princeton, N. J.

W. K. H. PANOFSKY, Stanford University, Stanford, Calif.

E. SEGRE, University of California, Berkeley, Calif.

- L. W. SMITH, Brookhaven National Laboratory, Upton, Long Island, N. Y.
 J. STEINBERGER, Columbia University, New York, N. Y.
 V. F. WEISSKOPF, Oxford University, Oxford, England.
 R. R. WILSON, Cornell University, Ithaca, N. Y.

Scientific Information Exchange

- THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS, Cambridge, Mass.; *Analysis, Correlation, and Publication of Visual Observations of Variable Stars*; 2 years; \$12,400.
- AMERICAN CRYSTALLOGRAPHIC ASSOCIATION, Baltimore, Md.; *Critical Compilation of Crystal Data*; 18 months; \$6,300.
- AMERICAN DOCUMENTATION INSTITUTE, Bethesda, Md.; *Payment of Annual Dues for 1955 to the International Federation of Documentation*; \$650.
- AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *General Conference of Editors of Biological Journals*; 1 year; \$16,675.
- AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *English Editions of the Russian Publications: Journal of Technical Physics, Doklady (Physics Section) and Journal of Acoustics*; 1 year; \$76,500.
- AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Publication of an Extra Volume of "The Transactions" of the American Mathematical Society; Calendar 1956 and 1957*; \$6,000.
- AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Preparing and Distributing Selected Translations of Russian Mathematics Articles*; 1 year; \$11,040.
- AMERICAN SOCIETY OF LIMNOLOGY AND OCEANOGRAPHY, Bloomington, Ind.; *Limnology and Oceanography*; 3 years; \$5,000.
- BIOLOGICAL ABSTRACTS, Philadelphia, Pa.; *The Compilation, Publication, and Distribution of The Subject Indexes to Volumes 28 and 29 of the scientific periodical, Biological Abstracts*; 1 year; \$20,000.
- BIOLOGICAL ABSTRACTS, Philadelphia, Pa.; *Translation and Publication of Abstracts from the Russian Journal, Referativnyi Zhurnal: Biologiya*; 6 months; \$4,853.
- INTERNATIONAL ASSOCIATION FOR PLANT TAXONOMY, Cambridge, Mass. *Directory of Specialists in Taxonomy of Plants*; 2 years; \$4,700.
- LIBRARY OF CONGRESS, Washington, D. C.; *Reference Center for Reports on Government-Supported Scientific Research*; 14 months; \$17,500.
- LIBRARY OF CONGRESS, Washington, D. C.; *Center for Recording, Reporting, Duplicating, and Distributing Translations of Scientific Literature*; 1 year; \$26,950.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Methods of Translating Languages by Machine*; 1 year; \$24,800.
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass., *Conference on Methods of Translating Languages by Machines*; 6 months; \$2,300.
- NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; *Chemical-Biological Coordination Center*; 4 months; \$22,500.
- NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; *International Directory of Psychologists*; 1 year; \$10,000.
- NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; *The Need for Preserving Primary Scientific Records*; 1 year; \$10,000.
- NORTHWESTERN UNIVERSITY, Evanston, Ill.; *A Stereotaxic Atlas of the Cat Brain and a Stereotaxic Atlas of the Monkey Brain*; 2 years; \$3,500.
- SMITH COLLEGE, Northampton, Mass.; *Datura Genetics*; 2 years; \$13,800.
- SMITHSONIAN INSTITUTION, Washington, D. C.; *Partial Support for the Operating Expenses of the Biological Sciences Information Exchange*; 1 year; \$22,000.

SMITHSONIAN INSTITUTION, Washington, D. C.; *New Horizons*; 1 year; \$1,800.
WASHINGTON UNIVERSITY, St. Louis, Mo.; *Compilation of Generic Names of Fossil
Plants for the Index Nominum Genericorum*; 3 years; \$1,700.

APPENDIX D

Fellowship Programs

*Distribution of NSF Fellowships by State of Residence for the Academic Year
1956-1957*

NORTHEAST			NORTH CENTRAL		
<i>Region and State</i>	<i>Applications received</i>	<i>Awards made</i>	<i>Region and State</i>	<i>Applications received</i>	<i>Awards made</i>
Connecticut	67	22	Illinois	265	73
Maine	18	3	Indiana	80	21
Massachusetts	205	43	Iowa	41	14
New Hampshire	14	6	Kansas	47	9
New Jersey	163	42	Michigan	120	31
New York	598	141	Minnesota	79	22
Pennsylvania	258	74	Missouri	66	20
Rhode Island	29	5	Nebraska	26	8
Vermont	7	1	North Dakota	11	1
			Ohio	133	38
			South Dakota	20	5
			Wisconsin	67	23
SOUTH			WEST		
Alabama	27	7	Arizona	12	3
Arkansas	31	10	California	346	125
Delaware	11	2	Colorado	29	7
District of Columbia	23	5	Idaho	8	2
Florida	53	11	Montana	12	3
Georgia	22	4	Nevada	3	0
Kentucky	26	6	New Mexico	10	1
Louisiana	38	4	Oregon	45	14
Maryland	90	19	Utah	32	5
Mississippi	15	4	Washington	75	25
North Carolina	59	13	Wyoming	12	4
Oklahoma	45	10			
South Carolina	25	2	POSSESSIONS		
Tennessee	34	5	Alaska	1	0
Texas	79	17	Hawaii	13	2
Virginia	51	12	Puerto Rico	3	0
West Virginia	9	1	Others	6	0

*Distribution of NSF Fellowship Awards by Year of Study and Field
Academic Year 1956-57*

Field	Predoctoral			Post-doctoral (regular)	Senior post-doctoral	Total
	First year	Intermediate	Terminal year			
Life sciences.....	62	82	50	37	28	259
Chemistry.....	51	74	57	22	7	211
Engineering.....	60	31	18	3	1	113
Earth sciences.....	14	17	9	5	3	48
Mathematics.....	32	24	11	16	4	87
Physics and astronomy.....	74	70	28	12	9	193
Convergent fields.....	3	4	4	3	0	14
Totals.....	296	302	177	98 ¹	52	925

¹ Includes 18 awards made in October 1955.

*Names, Residences, and Fields of Study of Individuals Awarded National
Science Foundation Fellowships for Fiscal Year 1956*

ALABAMA

Predoctoral

CHASTAIN, BENJAMIN B., Birmingham, Chemistry.
DISMUKES, JOHN P., Montgomery, Chemistry.
KNIGHT, JAMES M., Mobile, Physics.
LAMPKIN, JULIA M., Tuscaloosa, Medical Sciences.
RHODES, WILLIAM C., Anniston, Biochemistry.
STEINBERG, CHARLES M., Montgomery, Biophysics.

Senior Postdoctoral

BROWN, RUSSELL W., Tuskegee Institute, Microbiology.

ARIZONA

Predoctoral

BALL, JAMES S., Tempe, Physics.
COOPER, CHARLES F., Tucson, Botany.
JUSTICE, KEITH E., Tucson, Zoology.

ARKANSAS

Predoctoral

ASKEY, RICHARD A., Little Rock, Mathematics.
CARRUTH, GEORGE A., Charleston, Agriculture.
EVERETT, WAYNE W., Benton, Biochemistry.
LEMING, HOWELL E., Fayetteville, Chemistry.
PRICKETT, ROBERT J., Pine Bluff, Engineering.
RODGERS, TOMMY A., Hot Springs, Chemistry.
SPRAGINS, JOHN D., Jr.,¹ Batesville, Engineering.
STALLINGS, JOHN R., Morrilton, Mathematics.
WASSON, JOHN T., Springtown, Chemistry.
WILLIS, WILLIAM J., Fort Smith, Physics.

¹ Declined.

CALIFORNIA

Predoctoral

- ADAMS, PHILLIP A., Los Angeles, Zoology.
 ANDELIN, JOHN P., Jr.,¹ Los Angeles, Physics.
 APPLEQUIST, JON B., Berkeley, Chemistry.
 AZAR, LEONARD, Redondo Beach, Engineering.
 BAKER, GEORGE A., Jr., Davis, Physics.
 BARTON, PATRICIA ANNE, Alhambra, Microbiology.
 BASS, HYMAN, Los Angeles, Mathematics.
 BERKSON, EARL R., Los Angeles, Mathematics.
 BERTANI, L. ELIZABETH, Pasadena, Microbiology.
 BLAIR, PHYLLIS B., Berkeley, Genetics.
 BOSWELL, GEORGE A., Oakland, Chemistry.
 BOTTINI, ALBERT T., Petaluma, Chemistry.
 BRANDT-ERICHSEN, JEAN, Solvang, Zoology.
 BREDON, GLEN E., Sanger, Mathematics.
 BRIDGES, WILLIAM B.,¹ Inglewood, Engineering.
 BROKAW, CHARLES J., El Segundo, Zoology.
 BROWN, LOWELL S., Visalia, Physics.
 BYRON, STANLEY R., San Mateo, Engineering.
 CARPENTER, WAYNE R., Claremont, Chemistry.
 CHER, MARK, Los Angeles, Chemistry.
 CHINN, JAMES, Berkeley, Engineering.
 CIMA, RICHARD M., Orosi, Engineering.
 COLBY, THOMAS H., San Leandro, Chemistry.
 CONDON, PAUL E., Berkeley, Physics.
 CRANSTON, MARGARET B., Altadena, Zoology.
 CURL, ROBERT F., Jr., Berkeley, Chemistry.
 DAYBELL, MELVIN D., Oceanside, Physics.
 DE NEVERS, NOEL H., San Francisco, Engineering.
 DEWHIRST, KENNETH C., Tracy, Chemistry.
 DICKINSON, WILLIAM R., Menlo Park, Earth Sciences.
 DONOVAN, PAUL F., Berkeley, Chemistry.
 ELLIS, WALTON P.,¹ Whittier, Chemistry.
 ELSESSER, ERIC,¹ Palo Alto, Engineering.
 EZRA, ARTHUR A., Menlo Park, Engineering.
 FIELD, GEORGE F., Linden, Chemistry.
 FONG, PAUL, San Francisco, Mathematics.
 FRAZER, WILLIAM R., Orinda, Physics.
 FUCHS, RONALD, Altadena, Physics.
 GLASS, LAUREL E., Fresno, Zoology.
 GRAY, JULIET M., Stanford, Psychology.
 HALL, HAROLD R., Oildale, Engineering.
 HAMILTON, WILLIAM F., Altadena, Physics.
 HANNA, MELVIN W., Van Nuys, Chemistry.
 HARRIS, ROBERT E., Berkeley, Chemistry.
 HERSCHBACH, DUDLEY R.,¹ Saratoga, Physics.
 HOMMERSAND, MAX H., La Mesa, Botany.
 HUANG, LUC, Oakland, Physics.
 HULTGREN, NEILEN W., Berkeley, Chemistry.
 KOCH, ELIZABETH A., Santa Monica, Microbiology.
 LANGENBERG, DONALD N., Berkeley, Physics.
 LAZARUS, ALAN J., San Francisco, Physics.
 LEVIN, ROBERT E.,¹ Santa Ana, Engineering.
 LITTLE, JOHN C., Stockton, Chemistry.
 MACIEL, GARY E., Livermore, Chemistry.
 MACMILLAN, ARCHIE J., Los Angeles, Engineering.
 MATHEWS, JON, Sierra Madre, Physics.
 MAYFIELD, IVAN JEANNE, Chino, Zoology.
 MCCUEN, PETER A., Bakersfield, Engineering.
 MESELSON, MATTHEW S., Los Angeles, Chemistry.
 NORRIS THOMAS G., Los Angeles, Engineering.
 OLIVIER, KENNETH L., Los Angeles, Chemistry.
 ORBACH, RAYMOND L., Los Angeles, Physics.
 ORVILLE, PHILIP M., Santa Monica, Earth Sciences.
 PARKER, BARBARA A., Los Angeles, Chemistry.
 QUON, JIMMIE E., Berkeley, Engineering.
 REEVES, ROBERT B., Whittier, Medical Sciences.

¹ Declined.

- RICHARDS, L. WILLARD**, Riverside, Chemistry.
- RICHARDS, PAUL L.**, Riverside, Physics.
- ROBERTSON, BALDWIN**, Los Angeles, Engineering.
- ROSENBLATT, RICHARD H.**, Los Angeles, Zoology.
- SASS, RONALD L.**, Los Angeles, Chemistry.
- SCOTT, DANA S.**¹ Corte Madera, Mathematics.
- SEDERHOLM, CHARLES H.**, Concord, Chemistry.
- SHIRLEY, DAVID A.**, Berkeley, Chemistry.
- SHREVE, RONALD L.**, Bishop, Earth Sciences.
- SNOW, SIDNEY R.**, North Hollywood, Genetics.
- SORENSEN, JOHN L.**, Los Angeles, Anthropology.
- STONE, JOHN G. II**, Stanford, Earth Sciences.
- STROMBOTNE, RICHARD L.**, Berkeley, Physics.
- SUTTON, DONALD D.**, Bakersfield, Microbiology.
- SYVERTSON, CLARENCE A.**¹ Menlo Park, Engineering.
- TAYLOR, HUGH P., Jr.**, Los Angeles, Earth Sciences.
- THOMASIAN, ARAM J.**, Berkeley, Mathematics.
- TINDERHOLT, VICTOR E.**, Los Angeles, Genetics.
- SCHMIDT, ROBERTA M. U.**, San Francisco, Zoology.
- WEDDLE, ORVILLE H.**, Granada Hills, Medical Sciences.
- WEITZNER, HAROLD**, San Francisco, Physics.
- WEYMANN, RAY J.**, Los Angeles, Astronomy.
- WILCOX, WILLIAM R.**¹ Torrance, Engineering.
- WILLIAMS, FORMAN A.**, Pasadena, Engineering.
- WILLIS, JOHN S.**, Pasadena, Zoology.
- WILSON, DAVID J.**, Stanford, Chemistry.
- WILSON, GARTH H.**, Oakland, Engineering.
- WILSON, JAMES F.**, Palo Alto, Microbiology.
- WOODS, WILLIAM G.**, Los Angeles, Chemistry.
- WOYCHESHIN, ELIAS A.**, Sacramento, Chemistry.
- Postdoctoral*
- BOVELL, CARLTON ROWLAND**, Davis, Microbiology.
- CHAMBERS, KENTON L.**¹ Atascadero, Botany.
- COX, CHARLES S.**, Del Mar, Earth Sciences.
- HARRIS, BRUNO**, Arcadia, Mathematics.
- HESTER, JOSEPH AARON, Jr.**, Los Angeles, Anthropology.
- HIRSCH, JEROME E.**¹ Berkeley, Psychology.
- JENSEN, WILLIAM AUGUST**, Pasadena, Botany.
- MITCHELL, ALBERT H.**¹ Berkeley, Physics.
- REID, WILLIAM H.**, Oakland, Mathematics.
- RIDDELL, DOROTHY MENZEL**, Berkeley, Anthropology.
- SCHUMAKER, VERNE N.**¹ Berkeley, Biophysics.
- SHERBY, OLEG DIMITRI**, Albany, Engineering.
- THOMPSON, GEORGE A.**, Palo Alto, Earth Sciences.
- THORSON, WALTER R.**, Los Angeles, Chemistry.
- TODD, DAVID K.**, Berkeley, Engineering.
- Senior Postdoctoral*
- ALFERT, MAX**¹ Berkeley, Zoology.
- BASSHAM, JAMES A.**, Berkeley, Biochemistry.
- BERN, HOWARD A.**¹ Berkeley, Medical Sciences.
- EAKIN, RICHARD M.**, Berkeley, Zoology.
- GIFFORD, ERNEST M., Jr.**, Davis, Botany.
- HYMAN, CHESTER**, Los Angeles, Medical Sciences.
- MARG, ELWIN**, Berkeley, Psychology.
- REDHEFFER, RAYMOND M.**, Los Angeles, Mathematics.
- REYNOLDS, DONALD M.**, Davis, Microbiology.
- SAUNDERS, PAUL R.**, S. Pasadena, Medical Sciences.
- SEKERA, ZDENEK**, Los Angeles, Earth Sciences.
- STENT, GUNTHER S.**¹ Berkeley, Biophysics.

¹ Declined.

STERLING, CLARENCE,¹ Davis, Biophysics.
 THOMPSON, GEORGE A.,¹ Palo Alto, Earth
 Sciences.

COLORADO

Predoctoral

BLANPIED, WILLIAM A., Denver, Physics.
 DUDLEY, PATRICIA L., Colorado Springs,
 Zoology.
 KELLOGG, HAROLD E., Arvada, Earth
 Sciences.
 MINNER, DE LEE F., Denver, Mathe-
 matics.
 NAZY, JOHN R., Denver, Chemistry.
 SCHLAGER, GUNTHER, Denver, Zoology.

Postdoctoral

SCHULZ, ARTHUR R., Fort Collins, Bio-
 chemistry.

CONNECTICUT

Predoctoral

AVERELL, JOHN P., Darien, Physics.
 CHURCHILL, LINDSEY C., Jr., Meriden,
 Mathematical Sociology.
 DRANOFF, JOSHUA S., Bridgeport,
 Engineering.
 GILBERT, WALTER, Westport, Physics.
 GOLDSTEIN, MELVIN J., New Haven,
 Chemistry.
 KELLEY, JOSEPH G., Thomaston, Physics.
 KOHN, ALAN J., Hamden, Zoology.
 MEIGS, ROBERT A., Newington,
 Biochemistry.
 MERMIN, N. DAVID, New Haven, Physics.
 POTTER, MARY C., Branford, Psychology.
 SANTER, URSULA V., New Haven,
 Microbiology.
 SCOVILLE, RICHARD A., Torrington,
 Mathematics.
 STEVENSON, KENNETH K., Berlin,
 Chemistry.
 TABOR, WILLIAM J., Rockfall, Chemistry.
 TIFFT, WILLIAM G., Seymour, Astronomy.

Postdoctoral

AMATRUDA, THOMAS T., Jr.,¹ New
 Haven, Medical Sciences.

GOULIAN, DICRAN, Jr., New Haven, Medi-
 cal Sciences.

POTTER, DAVID D., Branford, Zoology.
 STURTEVANT, WILLIAM C.,¹ New Haven,
 Anthropology.
 TABORSKY, GEORGE,¹ New Haven, Bio-
 chemistry.
 WILCOX, CHARLES F., Jr., Cos Cob,
 Chemistry.

Senior Postdoctoral

MACLEAN, PAUL D., Hamden, Medical
 Sciences.

DELAWARE

Predoctoral

ANDERSON, HOWARD W., Wilmington,
 Engineering.
 HARWITZ, MITCHELL, Wilmington, Math-
 ematical Economics.

DISTRICT OF COLUMBIA

Predoctoral

GOLDBERG, KARL, Washington, Mathe-
 matics.
 HOFFELD, DONALD R., Washington,
 Psychology.
 HOOKER, WILLIAM W., Washington,
 Mathematics.
 SEARS, RICHARD L., Washington, As-
 tronomy.

Senior Postdoctoral

MANDEL, H. GEORGE,¹ Washington,
 Medical Sciences.

FLORIDA

Predoctoral

BENTLEY, F. EDWARD, Gainesville,
 Chemistry.
 BLESS, ROBERT C., Gainesville, Astron-
 omy.
 BROOKS, RODNEY A., Miami, Physics.
 BROWN, MORTON, Palm Beach, Chemistry.
 IRWIN, CAROL ANN, Jacksonville, An-
 thropology.
 MORRILL, JOHN B., Jr., Tallahassee,
 Zoology.

¹ Declined.

- PILGER, RICHARD C., Jr., West Palm Beach, Chemistry.
- WADSWORTH, DONALD VAN Z., Coral Gables, Earth Sciences.
- WOOD, JOHN A., Jr., Jacksonville, Earth Sciences.
- Postdoctoral*
- MILLON, RENE F., Hialeah, Anthropology.
- TOLLIN, GORDON, Tallahassee, Biochemistry.
- GEORGIA
- Predoctoral*
- DUNLAP, JULIAN L., La Grange, Physics.
- HART, HOWARD R., Jr., Rome, Physics.
- SMITH, THOMAS G., Jr.,¹ La Grange, Zoology.
- Postdoctoral*
- FRY, BILLY E., Clarkesville, Zoology.
- Senior Postdoctoral*
- MILLER, JAMES A., JR., Atlanta, Zoology.
- IDAHO
- Predoctoral*
- MERRILL, JOHN J.,¹ Twin Falls, Physics.
- REMSBERG, LOUIS P., Jr., Caldwell, Chemistry.
- ILLINOIS
- Predoctoral*
- APPELMAN, EVAN H., Chicago, Chemistry.
- BACKUS, GEORGE E., Riverdale, Physics.
- BARON, ROBERT E., Chicago, Physics.
- BJORKEN, JAMES D., Park Ridge, Physics.
- BREWER, RICHARD D., Murphysboro, Zoology.
- BUTLER, DONALD C., Chicago, Psychology.
- CARLOCK, JOHN, R., Bloomington, Zoology.
- COHEN, PAUL J., Chicago, Mathematics.
- DEWEY, RAY S., Chicago, Chemistry.
- DRAKE, FRANK D.,¹ Chicago, Astronomy.
- DRAKE, JOHN W., Wilmette, Microbiology.
- EDWARDS, HAROLD M., Jr., Champaign, Mathematics.
- ENRIETTO, JOSEPH F.,¹ Champaign, Engineering.
- ERLEBACHER, ALBERT, Chicago, Psychology.
- FAHRENHOLTZ, KENNETH E., Peoria, Chemistry.
- FILSON, DON P., Chicago, Chemistry.
- GELLER, DAVID M., Oak Park, Biochemistry.
- GINSBERG, DONALD M., Chicago, Physics.
- GOSTKIEWICZ, ROMAN J., Chicago, Physics.
- HALFORD, DONALD W., Metamora, Chemistry.
- HARRIS, SAMUEL M., Chicago, Physics.
- HARTZELL, GORDON E., Urbana, Chemistry.
- HARTZLER, HARRIS D., Chicago, Chemistry.
- HENRY, RICHARD W., Urbana, Physics.
- HILL, ROBERT N., Evanston, Physics.
- JAMES, PHILIP N., Champaign, Chemistry.
- JOSEPH, DAVID W., Wheaton, Physics.
- KAISER, THOMAS E., Chicago, Chemistry.
- KLEIN, MILES V., Highland Park, Physics.
- KNIGHT, FRANK B., Chicago, Mathematics.
- LANDAUER, THOMAS K., Highland Park, Anthropology.
- LE NOBLE, WILLIAM J., Chicago, Chemistry.
- LLOYD, RONALD M., Oak Park, Earth Sciences.
- MAC RAE, ROBERT E., Chicago, Mathematics.
- MASSEY, JAMES L.,¹ Ottawa, Engineering.
- MATTESON, DONALD S., Champaign, Chemistry.
- MC MICHAEL, KIRK D., Ingleside, Chemistry.
- PARKER, EVELYN D., Galesburg, Biochemistry.
- QUAY, PAUL M., S. J., Oak Park, Physics.
- REINMUTH, WILLIAM H., Chicago, Chemistry.

¹ Declined.

RESING, HENRY A., Chicago, Chemistry.
 REYNOLDS, JOHN C., Glen Ellyn, Physics.
 RICHEY, HERMAN G., Chicago, Chemistry.
 ROMANO, RICHARD C., Chicago, Engineering.
 RYBICKI, GEORGE B., Chicago, Physics.
 SAGERS, RICHARD D., Champaign, Microbiology.
 SAVITT, DONALD A.,¹ Chicago, Engineering.
 SHORES MAN, PETER B.,¹ Winnetka, Genetics.
 SMITH, KATHERINE A., Hinsdale, Psychology.
 SPEER, DONALD A., Morton Grove, Chemistry.
 STUDTMANN, GEORGE H., Jr., Chicago, Engineering.
 SWANSON, ROBERT A., Chicago, Physics.
 WALLMAN, EDWIN J., Jr., Chicago, Engineering.
 WENTZEL, DONAT G., Chicago, Physics.
 WHITE, JAMES S.,¹ Hillside, Engineering.
 WHITESIDE, ARLISS E., Joliet, Engineering.
 WOLF, JOSEPH A., Chicago, Mathematics.
 WOOD, JOSEPH M., Chicago, Botany.
 ZIMMERMAN, STEVEN B., Chicago, Biochemistry.

Postdoctoral

DICKERSON, RICHARD E., Charleston, Chemistry.
 FANTA, PAUL E., Chicago, Chemistry.
 KENDE, ANDREW S.,¹ Evanston, Chemistry.
 LAW, JOHN H., Jr., Park Forest, Biochemistry.
 LIEHR, ANDREW DAVIS, Chicago, Chemistry.
 NELSON, PHILLIP G., Chicago, Medical Sciences.
 PENNER, SAMUEL, Champaign, Physics.
 SCHULTZ, THEODORE DAVID, Glencoe, Physics.
 STEJSKAL, EDWARD O., Berwyn, Chemistry.

Senior Postdoctoral

BATEMAN, PAUL T., Urbana, Mathematics.

DAY, MAHLON M., Urbana, Mathematics.
 KORST, HELMUT H., Champaign, Engineering.
 SCHUBERT, JACK, Villa Park, Biochemistry.
 SIEVER, RAYMOND, Urbana, Earth Sciences.

INDIANA

Predoctoral

CHESICK, JOHN POLK, New Castle, Chemistry.
 CLARKE, FRANK R., Bloomington, Psychology.
 CZANDERNA, ALVIN W., West Lafayette, Chemistry.
 DAVIS, ROBERT E., Valparaiso, Chemistry.
 DODD, JAMES R., Bloomington, Earth Sciences.
 FRANKMANN, RAYMOND W., Jr., Bloomington, Psychology of Learning.
 HARRISON, JACK L., Granger, Earth Sciences.
 LONG, LEON E., Gary, Chemistry.
 LORDAN, WILLIAM C., Gary, Mathematics.
 MEDITCH, JAMES S., Indianapolis, Engineering.
 PETERS, DONALD L., Chesterton, Engineering.
 RAY, CLAYTON E., Indianapolis, Earth Sciences.
 SHEPHERD, WILLIAM D., Gary, Physics.
 SHIELDS, JAMES E., Marion, Biochemistry.
 SHONLE, JOHN I., Indianapolis, Physics.
 STILLER, MARY L., Connersville, Botany.
 WILT, FRED H., Nappanee, Zoology.
 ZIMMERMAN, JAMES R., Anderson, Zoology.

Postdoctoral

HARRIS, JOSEPH DAVID, Lafayette, Physics.
 NELSON, J. EDWARD, Gary, Mathematics.
 OSTER, IRWIN ISAAC, Bloomington, Genetics.

IOWA

Predoctoral

BAKER, BILLY R., Iowa City, Engineering.
 ENGLER, JEAN A., Mason City, Psychology.

¹ Declined.

FELLOWS, LARRY D., Shenandoah, Earth Sciences.

GARST, JOHN F., Ames, Chemistry.

GESKE, DAVID H., Atalissa, Chemistry.

KERR, NORMAN S., Charles City, Microbiology.

LATHROP, JOHN F., Cedar Rapids, Physics.

RENEKER, DARRELL H., Birmingham, Physics.

SMITH, CHARLES V., Des Moines, Engineering.

WILBOIS, ANNETTE D., Des Moines, Genetics.

WOOLDRIDGE, CHARLES E., Mason City, Engineering.

Postdoctoral

ROZEBOOM, WILLIAM W., Ottumwa, Philosophy of Science.

Senior Postdoctoral

HAMMOND, GEORGE S., Ames, Chemistry.

NELSON, EDWARD B., Iowa City, Physics.

KANSAS

Predocctoral

BAKIS, RAIMO, Sterling, Physics.

EHRlich, PAUL R., Lawrence, Zoology.

ENOS, PAUL P.,¹ Perry, Earth Sciences.

HETHERINGTON, JACK H., Wichita, Physics.

LUNDEEN, ALLAN J., Fowler, Chemistry.

NEWBY, FRANK A., Jr., Columbus, Chemistry.

ROGERS, GARY B., Manhattan, Engineering.

SOMMER, WARREN T., Manhattan, Physics.

YANG, JOHN Y., Eudora, Chemistry.

KENTUCKY

Predocctoral

CANTRILL, JAMES E., Lexington, Chemistry.

LEWIS, RUSSELL J., Liberty Road, Agriculture.

RAGLAND, JOHN L., Beaver Dam, Agriculture.

VANDENBOSCH, ROBERT, Lexington, Chemistry.

Postdoctoral

GILBERT, J. FREEMAN, Jr., Lawrenceburg, Earth Sciences.

LOUISIANA

Predocctoral

BATTAILE, JULIAN, Locombe, Biochemistry.

HOWE, HERBERT J., Baton Rouge, Earth Sciences.

LEMMON, WILLIAM W., New Orleans, Mathematics.

SCHOTT, EDWARD W., S. J., New Orleans, Biochemistry.

MAINE

Predocctoral

BERKELMAN, KARL, Lewiston, Physics.

COMMERFORD, SPENCER L., Belfast, Biochemistry.

SILVER, IRVING R., Portland, History of Science.

MARYLAND

Predocctoral

EVANS, DAVID R., Baltimore, Zoology.

FLETCHER, JOHN G., Chevy Chase, Physics.

GOLDSMITH, MARY H., College Park, Zoology.

GOLDSMITH, TIMOTHY H.,¹ College Park, Zoology.

HEARN, B. CARTER, Jr., Baltimore, Earth Sciences.

HOPFIELD, JOHN J., Bethesda, Physics.

KAUFMANN, JOHN H., Towson, General Biology.

McALLISTER, JOSEPH P., Cambridge, Mathematics.

REESE, WILLIAM D., Owings Mills, Botany.

ROTBERG, IRIS C., Baltimore, Psychology.

TAEUBER, KARL E., Hyattsville, Demography.

THOMAS, T. DARRAH, Chevy Chase, Chemistry.

WHITAKER, STEPHEN, Elkton, Engineering.

WILLIS, EDWIN O., Baltimore, Zoology.

¹ Declined.

Postdoctoral

- BRODY, ELMER J., Chevy Chase, Mathematics.
 DYER, ELDON, Baltimore, Mathematics.
 KAO, RICHARD C.,¹ Woodbine, Statistical Design.
 SPENCER, GUILFORD L., II, College Park, Mathematics.

Senior Postdoctoral

- GREENBERG, JOSEPH, Bethesda, Medical Sciences.

MASSACHUSETTS

Predocctoral

- ARONSON, ARTHUR I., Newton, Microbiology.
 AYOUB, MILLIGENT R., Cambridge, Anthropology.
 BARR, R. MACDONALD, Cambridge, Engineering.
 BAYM, GORDON A., Pittsfield, Physics.
 BLUM, RALPH, Cambridge, Anthropology.
 BRILLIANT, MARTIN B., Boston, Engineering.
 CARY, HELEN E., North Amherst, Chemistry.
 CULVAHOUSE, JACKIE W., Cambridge, Physics.
 CURRY, GEORGE M., Groton, Botany.
 DANIELS, GERALD M., Roxbury, Physics.
 DAVIS, ROBERT J.,¹ Arlington, Astronomy.
 EIGNER, JOSEPH, Swampscott, Chemistry.
 EVENS, LEONARD, Brookline, Mathematics.
 FARNHAM, ANN E., Boston, Microbiology.
 FESSENDEN, RICHARD W., North Amherst, Chemistry.
 FISHMAN, FRANK J., Jr., Somerville, Physics.
 GOSSARD, ARTHUR C., Quincy, Physics.
 HOHENBERG, PIERRE C.,¹ Cambridge, Physics.
 JENNESS, JONATHAN, Cambridge, Anthropology.
 LA TOURETTE, JAMES T., Cambridge, Physics.
 LEON, BENJAMIN J., Cambridge, Engineering.
 LINDQUIST, RICHARD W., Worcester, Physics.
 MILLER, FRANK C., Boston, Anthropology.

- MUCKENHOUP, BENJAMIN, Newton Highlands, Mathematics.
 OFENGAND, EDWARD J., Taunton, Microbiology.
 PANAGOS, SYLVIA S., Lynn, Medical Sciences.
 PARLOW, ALBERT F., Everett, Zoology.
 RAUP, DAVID M., Petersham, Earth Sciences.
 SCHAFER, BERTRAM J.,¹ Cambridge, History of Science.
 SHEPARD, SUSAN C.,¹ West Falmouth, Earth Sciences.
 TUGENDHAT, BEATRICE, Webster, Psychology.
 WHITE, R. WINSLOW, Somerville, Chemistry.
 WILSON, KENNETH G., Concord, Physics.

Postdoctoral

- ALLEN, DAVID W., Boston, Medical Sciences.
 EMMERLING, MARGARET H., Leominster, Genetics.
 MILKMAN, ROGER D., Cambridge, Genetics.
 NEISSER, ULRIC, Cambridge, Psychology.
 ROBBINS, PHILLIPS W.,¹ Leominster, Biochemistry.
 TREFETHEN, LLOYD M., Lexington, Engineering.

Senior Postdoctoral

- EYGES, LEONARD J., Belmont, Physics.
 FISKE, VIRGINIA MAYO, Sherborn, Zoology.
 SELOVE, WALTER, Cambridge, Physics.
 WILSON, E. BRIGHT, Jr., Concord, Chemistry.

MICHIGAN

Predocctoral

- ALLERTON, SAMUEL E., Kalamazoo, Biochemistry.
 ANGUS, JOHN C., Spring Lake, Chemistry.
 BOUWSMA, WARD D., Grand Rapids, Mathematics.

¹ Declined.

BRINEY, ROBERT E., Muskegon, Mathematics.
 CLOSSON, WILLIAM D.,¹ Remus, Chemistry.
 DOW, DANIEL G.,¹ Ann Arbor, Engineering.
 GERBER, CARL J., Detroit, Medical Science.
 GRAESSLEY, WILLIAM W., Ann Arbor, Engineering.
 GREEN, DAVID M., Tecumseh, Psychology.
 HAZARD, EVAN B., Pinckney, Zoology.
 HEIN, GEORGE E., Ann Arbor, Chemistry.
 MACK, LAWRENCE R.,¹ Plymouth, Engineering.
 MEYER, WALTER L., Ann Arbor, Chemistry.
 MOORE, PHYLIS T., Detroit, Chemistry.
 NELSON, FREDERIC F., Grand Rapids, Chemistry.
 NICHOLS, WILLIAM H., Detroit, Physics.
 O'CONNELL, RICHARD H., Ann Arbor, Psychology.
 REIMUS, RICHARD G., Saginaw, Engineering.
 SHIELDS, PAUL C., South Haven, Mathematics.
 SHURE, FRED C., Ann Arbor, Physics.
 SMALL, GEORGE E., Jackson, Engineering.
 SMITH, HARRY A., Grand Rapids, Chemistry.
 SPENCER, JOHN L., Ann Arbor, Chemistry.
 SPITZER, DONALD P., Bridgman, Chemistry.
 STASHEFF, JAMES D., Ann Arbor, Mathematics.
 WINDER, ROBERT O., Ann Arbor, Mathematics.
 YOUNGDALE, GILBERT A., Detroit, Chemistry.

Postdoctoral

ADDISON, JOHN W., Jr., Ann Arbor, Mathematics.
 AUSLANDER, MAURICE, Ann Arbor, Mathematics.
 BAKAN, PAUL, East Lansing, Psychology.
 HERRMANN, ROBERT L.,¹ East Lansing, Biochemistry.

MINNESOTA

Predocctoral

ABBOTT, ROSE MARIE H. S., Minneapolis, Botany.
 ACKERBERG, ROBERT C., Minneapolis, Engineering.
 AHLQUIST, JOHN B.,¹ Minneapolis, Engineering.
 EHRHORN, RICHARD W., Rochester, Engineering.
 ELLASON, MORTON A., Moorhead, Chemistry.
 ERNST, WALLACE G., Minneapolis, Earth Sciences.
 FAWCETT, MARK S., Winona, Chemistry.
 FREDERICK, EDWARD C., Eagle Lake, Agriculture.
 GIESE, CLAYTON F., Minneapolis, Physics.
 HOLMES, JOHN C., South St. Paul, Zoology.
 JUNGAS, ROBERT L., Mountain Lake, Medical Sciences.
 LARSON, DAVID C., Cloquet, Physics.
 OSBORN, JAMES H., Winona, Chemistry.
 PEARSON, JAMES J., Minneapolis, Physics.
 PIERCE, RICHARD L., Minneapolis, Botany.
 ROISELAND, DONALD S., South St. Paul, Physics.
 SCOTT, PAUL C., Minneapolis, Chemistry.
 SUMPTION, LAVON J., St. Paul, Agriculture.
 WADE, WARREN F., Minneapolis, Engineering.

Postdoctoral

KING, WILLIAM T., St. Paul, Chemistry.
 ROYCE, PAUL C., Brainerd, Medical Sciences.

Senior Postdoctoral

WANNAMAKER, LEWIS W., St. Paul, Microbiology.

MISSISSIPPI

Predocctoral

BROWN, KATHLEEN, Jackson, Chemistry.
 MANGUM, BILLY W., Mize, Chemistry.
 RAWDON, W. KENNER, Vicksburg, Mathematics.
 SCAIFE, NORMAN C., Dundee, Earth Sciences.

¹ Declined.

MISSOURI

Predoctoral

- BALL, WILLIAM E.,¹ St. Louis, Engineering.
- BURLESON, NOEL D., Kansas City, Anthropology.
- DAVIS, ROWLAND H.,¹ University City, Genetics.
- DOWNES, WILLIAM L., Jr., Shrewsbury, Zoology.
- GILLESPIE, ROBERT W., Kansas City, Mathematical Economics.
- GRUEN, LISE, Kansas City, Chemistry.
- HIGGINBOTHAM, HUGH B., Overland, Microbiology.
- KREMER, ELMAR J.,¹ St. Louis, Psychology.
- MEAD, C. ALDEN, Webster Groves, Chemistry.
- MIDDLEY, JAMES E.,¹ Kansas City, Physics.
- MONTGOMERY, DAVID C., Milan, Physics.
- O'CONNOR, RODNEY J., Gordonville, Chemistry.
- OEN, CAROL J., Columbia, Medical Sciences.
- PITTMAN, WILLIAM H., Columbia, Chemistry.
- SCHANUEL, STEPHEN H., Kirkwood, Mathematics.
- WIESMEYER, HERBERT, St. Louis, Microbiology.
- YOUNG, CHARLES W., Kirkwood, Agriculture.

Postdoctoral

- CANTWELL, MURRAY, St. Louis, Physics.
- STOUT, GEORGE H., St. Louis, Chemistry.

Senior Postdoctoral

- KAMEN, MARTIN D., University City, Biochemistry.

MONTANA

Postdoctoral

- BOOTS, DAVID A., Missoula, Earth Sciences.
- JORGENSEN, DALE W., Helena, Mathematical Economics.
- WESTERMAN, EDWIN J.,¹ Butte, Engineering.

NEBRASKA

Predoctoral

- DOMINGO, JOHN J., Weeping Water, Physics.
- EICHER, DON L., Lincoln, Earth Sciences.
- HAYES, JOHN B., Omaha, Earth Sciences.
- HUPP, EUGENE W., Norfolk, Agriculture.
- MCGARVEY, DAVID C., Omaha, Mathematics.
- SCHELKOPF, RUSSELL L., Geneva, Zoology.
- WRIGHT, CHARLES R. B., Lincoln, Mathematics.

Postdoctoral

- COUNCE, SHEILA JEAN, Hayes Center, Genetics.

NEW HAMPSHIRE

Predoctoral

- AYER, DONALD E., Bradford, Chemistry.
- CLARK, RONALD R., Groveton, Engineering.
- FITTS, DONALD D., Keene, Chemistry.
- JOHNSON, FREDERIC A., Concord, Chemistry.
- WOLFENDEN, RICHARD V., Hanover, Medical Sciences.

Postdoctoral

- MIRKIL, HAZLETON, Hanover, Mathematics.

NEW JERSEY

Predoctoral

- ANDERSEN, KENNETH K., Fords, Chemistry.
- BALDESCHWIELER, JOHN D., Cranford, Chemistry.
- BLAKER, J. WARREN, Rutherford, Chemistry.
- BREYER, ARTHUR C., East Orange, Chemistry.
- BROWER, JANE V. Z., Chatham, Zoology.
- BROWER, LINCOLN P., Madison, Zoology.
- CASSIDY, WILLIAM A., Roselle Park, Earth Sciences.
- CHRISTENSEN, ROBERT L.,¹ Princeton, Physics.

¹ Declined.

CIECIUCH, RONALD F. W., Jersey City,
Chemistry.

CLARK, ALVIN J., Morristown, Chemistry.

COHEN, WILLIAM C., Princeton, Engi-
neering.

DOEG, KENNETH A., Bergenfield, Zool-
ogy.

DOLOTTA, THEODORE A., Vineland, Engi-
neering.

FEDERBUSH, PAUL G., Newark, Physics.

HAND, LOUIS N., Summit, Physics.

HUFNAGEL, ROBERT E., Pompton Plains,
Engineering.

KING, CARY J., III,¹ Princeton, Engi-
neering.

KLAUDER, JOHN R.,¹ Morristown, Physics.

LEMAL, DAVID M., Fanwood, Chemistry.

MANDELBAUM, DAVID M., Hillside, Math-
ematics.

MILLER, BARRY, Passaic, Chemistry.

O'BRIEN, PAUL J., Haddonfield, Microbi-
ology.

PARE', VICTOR K., Woodbury, Physics.

REINKEN, DONALD L., Plainfield, Math-
ematics.

ROSEN, GERALD H., Teaneck, Physics.

ROSENFELD, JACK L., Long Branch, Engi-
neering.

RUSCH, WILLARD V., Lambertville, Engi-
neering.

SAGAN, CARL E., Rahway, Astronomy.

SWAN, RICHARD G., Boonton, Math-
ematics.

VARRIN, ROBERT D., Arlington, Earth
Sciences.

WARTER, PETER J., Jr., Trenton, Engi-
neering.

YOUNG, RICHARD W.,¹ Westwood, Medi-
cal Sciences.

ZANET, PAUL M., Clifton, Chemistry.

Postdoctoral

AUSLANDER, LOUIS, Princeton, Math-
ematics.

BASS, ROBERT W.,¹ Princeton, Math-
ematics.

HOLLAND, HEINRICH D., Princeton, Earth
Sciences.

TOBOCMAN, WILLIAM, Princeton, Physics.

WEINER, IRWIN M., New Egypt, Medical
Sciences.

Senior Postdoctoral

HALBERT, SEYMOUR P.,¹ Hillsdale, Micro-
biology.

JACOBS, WILLIAM P., Princeton, Botany.

WIGHTMAN, ARTHUR S., Princeton, Phys-
ics.

WILLIAMS, ROGER W., Tenafly, Medical
Sciences.

NEW MEXICO

Predocctoral

MODESITT, GEORGE E., Los Alamos,
Physics.

NEW YORK

Predocctoral

ABRAMSON, LEE R., New York, Math-
ematics.

ADELBERG, ARNOLD M., Brooklyn, Math-
ematics.

ARMSTRONG, JOHN A.,¹ Schenectady,
Physics.

ASH, ROBERT B.,¹ Jamaica, Engineering.

BARD, ALLEN J., New York, Chemistry.

BARRY, THOMAS W., Ithaca, Zoology.

BAUER, VICTOR J., White Plains, Chem-
istry.

BAUM, LEONARD E., Brooklyn, Math-
ematics.

BENNETT, GORDON D., Elmira, Earth
Sciences.

BERMAN, SIMEON M., Brooklyn, Math-
ematical Economics.

BIENENSTOCK, ARTHUR I., New York,
Physics.

BOWNE, SAMUEL W., Jr., Ithaca, Genetics.

BRANDT, PETER W., New York, Engineer-
ing.

BUDD, RICHARD, New York, Physics.

BUTZ, ARTHUR R., Douglaston, Engineer-
ing.

CASSIE, ROBERT M., Lowville, Earth
Sciences.

CONTI, JAMES J., Brooklyn, Engineering.

CORNER, MICHAEL A., New York, Zool-
ogy.

DICK, STANLEY, Brooklyn, Botany.

DUBNAU, DAVID A., Brooklyn, Zoology.

ECKERT, ROGER O., Bronx, Zoology.

ERNST, FREDERICK J., Jr., Ardsley, Phys-
ics.

¹ Declined.

- FALB, PETER L., Brooklyn, Mathematics.
- FARLEY, DONALD T., Jr.,¹ Bronxville, Physics.
- FEIN, ARTHUR, Brooklyn, Engineering.
- FREDKIN, DONALD R., Bronx, Mathematics.
- FREEMAN, RAOUL J.,¹ Queens Village, Mathematical Economics.
- FUNDERBURG, JOHN M., Bronxville, Engineering.
- FURSTENBERG, HARRY, New York, Mathematics.
- GANS, CARL, New York, Zoology.
- GARDINER, WILLIAM C., Niagara Falls, Chemistry.
- GILINSKY, VICTOR, Bronx, Physics.
- GLASHOW, SHELDON L., New York, Physics.
- GOLDBERG, ABRAHAM, Staten Island, Physics.
- GORDON, MALCOLM S., Brooklyn, Zoology.
- HAFS, HAROLD D., Ithaca, Agriculture.
- HALL, ROBERT D., Rochester, Physics.
- HARRIS, MORTON E., Brooklyn, Mathematics.
- HARRIS, THOMAS M., Lockport, Chemistry.
- HELFAHD, EUGENE, Brooklyn, Chemistry.
- HELLER, PETER, New York, Physics.
- HERTZIG, DAVID, Brooklyn, Mathematics.
- HINCKLEY, ALDEN D., New York, Zoology.
- HORING, NORMAN J., Brooklyn, Physics.
- HORRIGAN, FRANK A., New Rochelle, Physics.
- HORSTEIN, MICHAEL,¹ Brooklyn, Engineering.
- JANOFF, AARON, Bronx, Zoology.
- KAGAN, EILEEN K., Riverdale, Psychology.
- KAHANE, CHARLES, New York, Mathematics.
- KAISER, ROBERT, New York, Engineering.
- KATZ, THOMAS J., Forest Hills, Chemistry.
- KAYE, NANCY E. W., New York, Zoology.
- KLOTZ, TILLA S., New York, Mathematics.
- KOLENKOW, ROBERT J., Niagara Falls, Physics.
- KRISHER, LAWRENCE C., Livonia, Chemistry.
- LAMBERT, LORETTA, North Bellmore, Microbiology.
- LASWICK, JOHN A., Ithaca, Chemistry.
- LAUFER, WILMA P., Forest Hills, Zoology.
- LEROI, GEORGE E., Peekskill, Chemistry.
- LEVINE, FRED, Brooklyn, Physics.
- LEW, JOHN S., Larchmont, Physics.
- LIGHT, JOHN C., Mt. Vernon, Chemistry.
- LUBELL, ALICE R., Brooklyn, Botany.
- LUBKIN, ELIHU, Brooklyn, Physics.
- LYNCH, EUGENE J. M., La Fayette, Physics.
- MAGE, ROSE G., New York, Microbiology.
- MANLEY, OSCAR P., Forest Hills, Engineering.
- MARVIN, DONALD A., Ossining, Biophysics.
- MATELES, RICHARD I., New York, Biochemistry.
- MCCARTHY, CHARLES A., Rochester, Mathematics.
- MCCLURE, JAMES D., Glen Cove, Chemistry.
- MCCUMBER, DEAN E., Rochester, Physics.
- MCLEOD, DONALD W., Rochester, Physics.
- METZNER, JOHN J., Rego Park, Engineering.
- MILLER, RICHARD W., Buffalo, Biochemistry.
- OLANDER, DONALD R., New York, Engineering.
- OLSEN, MARY J., Garden City, Zoology.
- PALEY, HIRAM, Rochester, Mathematics.
- PEARLMAN, ROBERT, Long Beach, Mathematics.
- PERSHAN, PETER S., Brooklyn, Physics.
- PESKOFF, ARTHUR, Jamaica, Engineering.
- PORILE, NORBERT T., Larchmont, Chemistry.
- REISFELD, MARTIN J., Brooklyn, Physics.
- REITMAN, WALTER R.,¹ New York, Psychology.
- RIND, KENNETH W., Brooklyn, Chemistry.
- RODRIGUEZ, DAVID A., New Rochelle, Engineering.
- ROZIN, PAUL N., Brooklyn, Psychology.
- RUBINSTEIN, SOLOMON, Bronx, Mathematics.
- SAGE, MARTIN L., New York, Chemistry.
- SALZMAN, ALICE J., Bronx, Chemistry.
- SANTORO, ANGELO V., Brooklyn, Chemistry.
- SATIR, PETER G.,¹ New York, Zoology.
- SCHARF, BERTRAM, New York, Psychology.

¹ Declined.

SCHULT, ROY L.,¹ Geneva, Physics.
 SCHULTZ, JONAS, Brooklyn, Physics.
 SCHUSTER, DAVID I., Far Rockaway, Chemistry.
 SEERY, VIRGINIA L., Elmont, Zoology.
 SHAKIN, CARL, New York, Physics.
 SHAPIRO, ROBERT, New York, Chemistry.
 SILVER, MARC S., New Rochelle, Chemistry.
 SMITH, DAVID Y., Schenectady, Physics.
 SOMMERFIELD, CHARLES M., Brooklyn, Physics.
 STAFFORD, FRED E., Bronx, Chemistry.
 STARK, GEORGE R., New York, Biochemistry.
 STEIN, NORMAN, Laurelton, Mathematics.
 STEIN, SIDNEY, New York, Engineering.
 STERNHEIM, MORTON M., New York, Physics.
 STEWART, DARYL G., Ithaca, Zoology.
 STILLINGER, FRANK H., Scarsdale, Chemistry.
 STRICKLER, STEWART J., New York, Chemistry.
 STRUMEYER, DAVID H., Brooklyn, Biochemistry.
 SWIFT, MICHAEL R., Brooklyn, Mathematics.
 TAYLOR, HOWARD S., Bronx, Chemistry.
 THIES, ROGER E., Scarsdale, Medical Sciences.
 THORNDIKE, EDWARD H., Montrose, Physics.
 TOBIAS, IRWIN, Brooklyn, Chemistry.
 VINCOW, GERSHON, Brooklyn, Chemistry.
 VOZICK, MICHAEL W., New York, Biochemistry.
 WAHLIG, MICHAEL A., Woodside, Physics.
 WASSERMAN, RICHARD S., Richmond Hill, Mathematics.
 WEHN, DONALD, Brooklyn, Mathematics.
 WEINBERG, STEVEN, Forest Hills, Physics.
 WYTTENBACH, CHARLES R., Elmira, Zoology.

Postdoctoral

BARKER, JUNE N.,¹ Rochester, Medical Sciences.
 FEINBERG, GERALD, New York, Physics.
 GERTNER, SHELDON P.,¹ Hicksville, Medical Sciences.
 HOROWITZ, JACK, New York, Biochemistry.

JEPSEN, DONALD W., Niagara Falls, Chemistry.
 KONIGSBERG, WILLIAM H., New York, Chemistry.
 LEBOWITZ, JOEL L., New York, Physics.
 MARKOWITZ, SAMUEL S., Brooklyn, Chemistry.
 MCKIBBEN, JOHN J., Rockville Centre, Mathematics.
 O'BRIEN, REGINA TERESA, New York, Zoology.
 ORNSTEIN, DONALD S., Harrison, Mathematics.
 OROFINO, THOMAS A., Ithaca, Chemistry.
 RUBEL, LEE A., Ithaca, Mathematics.
 SIDMAN, JEROME W.,¹ Rochester, Chemistry.

Senior Postdoctoral

KAPLAN, J. GORDIN, New York, Medical Sciences.
 LEVY, MILTON, Long Island City, Biochemistry.
 LONG, FRANKLIN A., Ithaca, Chemistry.
 SCHERAGA, HAROLD A., Ithaca, Chemistry.

NORTH CAROLINA

Predocctoral

ALEXANDER, SHELTON S.,¹ Statesville, Earth Sciences.
 BARNES, ROBERT L., Durham, Botany.
 COGGINS, CHARLES W., Jr., Crouse, Botany.
 DEARMAN, HENRY H., Statesville, Chemistry.
 DOTSON, WILLIAM G., Jr.,¹ Badin, Mathematics.
 POSTMA, HERMAN, Wilmington, Physics.
 SNIPES, RAYMOND F., Reidsville, Chemistry.
 SUMNER, THOMAS H., Asheville, Mathematics.
 TAYLOR, DOROTHY J., Durham, Botany.
 YOW, FRANCIS W., Asheville, Zoology.

Postdoctoral

SHOENFIELD, JOSEPH R., Durham, Mathematics.
 SPIVEY, W. ALLEN, Wilmington, Mathematical Economics.
 WALTERS, GEOFFREY, Durham, Physics.

¹ Declined.

NORTH DAKOTA

Predoctoral

MILLER, WALTER P., Dickinson, Chemistry.

OHIO

Predoctoral

ACHENBACH, KARL E., Columbus, Psychology.

BAPTIST, JAMES N., Olmsted Falls, Biochemistry.

BROWN, W. STANLEY, Bedford, Physics.

BURFORD, ARTHUR E., North Olmsted, Earth Sciences.

BUSH, RICHARD W., Kent, Chemistry.

BUTLER, JAMES N., Lakewood, Chemistry.

CLARK, THOMAS J., St. Marys, Chemistry.

DUKES, ERNEST F., Jr., Dayton, Engineering.

ELDER, CAROL-ANN, Cleveland Heights, Botany.

FARRAND, WILLIAM R., Columbus, Earth Sciences.

FEIL, JOSEPH N., Cuyaloga Falls, Engineering.

FINK, CLINTON F., Cleveland, Psychology.

GARWIN, EDWARD L., Cleveland, Physics.

GRIERSON, JAMES D., Jr., Dayton, Botany.

HELMS, CARL W., Bowling Green, Zoology.

HESS, KARL W., Englewood, Chemistry.

HUFF, ROBERT W., Canton, Physics.

LEBOR, ANDREW S., Cincinnati, Mathematics.

LENHERT P. GALEN, Arcanum, Biophysics.

LOWENSTEIN, CARL D., Kent, Physics.

McKISSICK, ROBERT J., Coshocton, Mathematics.

MINCK ROBERT W.,¹ Defiance, Engineering.

OGG, ANDREW P., Bowling Green, Mathematics.

PRANGE, RICHARD E., Berea, Physics.

PRATT, VAL W., East Cleveland, Physics.

REBKA, GLEN A., Jr., Cincinnati, Physics.

REED, NANCY L., Middletown, Biochemistry.

RILLING, HANS C., Findlay, Biochemistry.

SHERA, NANCY K. L., Martins Ferry, Chemistry.

SIMPSON, A. LOUISE, Oberlin, Psychology.

SLAGGIE, E. LEO, JR., Dayton, Physics.

VAN VALEN, LEIGH, Cincinnati, General Biology.

VENETTA, BENJAMIN D., Warren, Medical Sciences.

Postdoctoral

GORDON, JOHN E.,¹ Columbus, Chemistry.

MURRAY, GEORGE R., Jr., Dayton, Chemistry.

PALIK, EDWARD D., Elyria, Physics.

TOBIAS, R. STUART, Columbus, Chemistry.

Senior Postdoctoral

GREENBERG, G. ROBERT, Cleveland, Biochemistry.

OKLAHOMA

Predoctoral

BRUNER, LEON J., Ponca City, Physics.

DABNEY, JOE M., Oklahoma City, Medical Sciences.

FOLKS, LEROY, Hydro, Mathematics.

FRETWELL, LYMAN J. Jr., Tulsa, Physics.

HEDGES, FRANK, Stillwater, Engineering.

KRUGER, CHARLES H., Oklahoma City, Engineering.

McCUNE, JAMES E., Tulsa, Engineering.

MEEKER, JAMES I., Oklahoma City, Engineering.

PRUITT, WILLIAM E., Oklahoma City, Mathematics.

YARBOROUGH, LEONE, Vinita, Mathematics.

OREGON

Predoctoral

BAIRD, RICHARD L., Portland, Chemistry.

BERENSON, PAUL J., Portland, Engineering.

DE BAR, ROGER B., Eugene, Physics.

DRUMMOND, WILLIAM E., Portland, Physics.

KIND, PHYLLIS D., Portland, Microbiology.

NISKANEN, WILLIAM A., Jr.,¹ Bend, Mathematical Economics.

OHLSEN, GERALD G., Eugene, Physics.

PIERCE, JACK, Eugene, Anthropology.

¹ Declined.

RIEGER, PHILIP H.,¹ Milwaukie, Chemistry.

ROSS, SHIRLEY E., Portland, Zoology.

SKIENS, W. EUGENE, Burns, Chemistry.

Postdoctoral

MARVELL, ELLIOT N., Corvallis, Chemistry.

Senior Postdoctoral

BARNETT, HOMER G., Eugene, Anthropology.

MARVELL, ELLIOT N.,¹ Corvallis, Chemistry.

PENNSYLVANIA

Predoctoral

BERTRAM, WALTER J., Jr., Pittsburgh, Physics.

BODOIA, JOHN R., Pittsburgh, Engineering.

BOHACHEVSKY, IHOR O., Philadelphia, Engineering.

BOYER, ROBERT E., Palmerton, Earth Sciences.

BOYER, ROBERT H., Johnstown, Physics.

BRIDGES, JOANNE M., McKees Rocks, Chemistry.

CAVANAUGH, JAMES R., Philadelphia, Chemistry.

CLUTTER, JEROME L., Pittsburgh, General Biology.

COX, DAVID J., Swarthmore, Biochemistry.

CUMBLIDGE, GLENN W.,¹ Butler, Engineering.

ECKERT, RAYMOND J.,¹ Philadelphia, Physics.

FOLK, ROBERT T., Allentown, Physics.

GLADFELTER, WILBERT E., Ridley Park, Medical Sciences.

GLARUM, SIVERT H., Wyncote, Chemistry.

GOLLUB, LEWIS R., Philadelphia, Psychology.

GOUTERMAN, MARTIN P., Philadelphia, Physics.

GRAY, STEPHEN B., Philadelphia, Physics.

GROOM, DONALD E., Turtle Creek, Physics.

HALL, ROBERT D., Philadelphia, Psychology.

HATCH, THEODORE F., Jr., Pittsburgh, Engineering.

HIRSCHFIELD, JUDITH B., Pittsburgh, Mathematics.

HOHMANN, JERE W., Volant, Engineering.

HUBERT, JOHN F., State College, Earth Sciences.

JOHNSON, LEON J., New Castle, Agriculture.

JONES, EVAN T., Rosemont, Chemistry.

JONES, RICHARD H., Ridley Park, Engineering.

KANE, ROBERT E., Erie, Zoology.

KAUFFMAN, MARVIN E., Lancaster, Earth Sciences.

KRONENBERGER, LAWRENCE, Pittsburgh, Engineering.

LE ROY, ANDRE F., Philadelphia, Chemistry.

LITTLE, WILLIAM A., Washington, Engineering.

LOVE, WILLIAM A., Pittsburgh, Physics.

MCGREW, CARL A., State College, Physics.

M McNUTT, DOUGLAS P., Philadelphia, Physics.

M C W I L L I A M S , IAN G., Philadelphia, Physics.

MELNGAILIS, IVARS, Butler, Engineering.

MILEY, GEORGE H., Petrolia, Engineering.

MORRISON, JAMES L., Pittsburgh, Physics.

MULLHAUPT, J. TIMOTHY, Warren, Chemistry.

MUNSON, RONALD A., Lancaster, Chemistry.

NEWELL, WILLIAM E., Sharon, Engineering.

OLENICZAK, ALBERT T., Philadelphia, Engineering.

ORTTUNG, WILLIAM H., Narberth, Chemistry.

PENDLETON, HUGH N., III, Pittsburgh, Physics.

REAGLES, CAROL L., Saegerstown, Earth Sciences.

ROBINSON, BRUCE B., Chester, Physics.

ROCKMORE, DAVID M., Cambridge Springs, Physics.

ROTHBERG, JOSEPH E., Philadelphia, Physics.

SCHWARZ, WILLIAM M., Jr., Harrisburg, Chemistry.

¹ Declined.

SHAPIRO, GILBERT, Philadelphia, Physics.
SHAW, LEONARD G., Philadelphia, Engineering.

SHEPPARD, RICHARD A., Lancaster, Earth Sciences.

SHER, LAWRENCE D., Merion, Physics.

SHOZDA, RAYMOND J., West Mifflin, Chemistry.

SIMMONS, VIOLET E., Philadelphia, Chemistry.

SMOLINSKY, GERALD, Philadelphia, Chemistry.

SNYDER, EUGENE I., Philadelphia, Chemistry.

SNYDER, LAWRENCE C., Pittsburgh, Chemistry.

SORENSEN, RAYMOND A., Pittsburgh, Physics.

STEIN, FRED P., Dallastown, Engineering.

VAISNYNS, JUOZAS R., Philadelphia, Chemistry.

WEIGEL, JOHN W., Carlisle, Physics.

WINDGASSEN, RICHARD J., Jr., Allison Park, Chemistry.

WISE, DONALD U., Lancaster, Earth Sciences.

WOODS, ROBERT M., Jr., New Wilmington, Physics.

ZENER, JOHN R.,¹ Pittsburgh, Physics.

Postdoctoral

LISS, THEODOR ARTHUR, Temple, Chemistry.

MISNER, CHARLES W.,¹ Pittsburgh, Physics.

PLUMB, ROBERT C., Saxonburg, Chemistry.

SEMENOW, DOROTHY ANN, Pittsburgh, Chemistry.

VOGELSONG, DONALD C., York, Chemistry.

WESTHEAD, EDWARD W., Jr., St. Davids, Biochemistry.

Senior Postdoctoral

FRANKEL, SHERMAN,¹ Philadelphia, Physics.

HALPERN, JULIUS, Bala-Cynwyd, Physics.

RHODE ISLAND

Predocctoral

GREENSTEIN, HOWARD B., Cranston, Physics.

SCOTT, DIANA F., Edgewood, Zoology.

SZYMANSKI, JOSEPH J., Providence, Physics.

TANENBAUM, B. SAMUEL, Providence, Physics.

Senior Postdoctoral

PECK, RUSSELL A., Jr., Providence, Physics.

SOUTH CAROLINA

Predocctoral

DEGGES, THOMAS C., Heath Springs, Physics.

Senior Postdoctoral

DE TAR, DELOS F., Columbia, Chemistry.

SOUTH DAKOTA

Predocctoral

HAENSEL, HUBERT D., Brookings, Agriculture.

MINEHART, RALPH C., Mitchell, Physics.

MONK, JAMES D., Spearfish, Mathematics.

ROZENDAL, ROGER A., Sioux Falls, Earth Sciences.

Postdoctoral

JACOBSON, KARL B.,¹ Sioux Falls, Biochemistry.

TENNESSEE

Predocctoral

BLANKENBECLER, RICHARD, Kingsport, Physics.

CHADWELL, ANDREW J., Jr., Knoxville, Chemistry.

COX, JAMES R., Jr., Nashville, Chemistry.

NUNNALLY, DAVID A., Memphis, Zoology.

WHITE, GERALD M., Oak Ridge, Engineering.

TEXAS

Predocctoral

ADAMCIK, JOE A., Austin, Chemistry.

AGOSTA, WILLIAM C.,¹ Dallas, Chemistry.

¹ Declined.

ARONS, HOWARD L., Dallas, Chemistry.
 ASHBY, NEIL, Dalhart, Physics.
 CLAYTON, DONALD D., Dallas, Physics.
 COLGATE, SAM O., Amarillo, Chemistry.
 COX, FRED B., Jr., Temple, Engineering.
 GORTON, BERT S., Houston, Chemistry.
 HAM, RICHARD G., Austin, Biochemistry.
 HILLIARD, JOHN R., Jr., San Antonio,
 Zoology.
 MONGER, JOANNE, Beaumont, Mathe-
 matics.
 PECK, CHARLES W., Freer, Physics.
 ROBERTS, LARRY S., Dallas, Zoology.

Postdoctoral

ISELL, JOHN ROLFE, Mercedes, Math-
 ematics.
 MATHIS, JOHN S., Dallas, Astronomy.

Senior Postdoctoral

PHILLIPS, GERALD C.,¹ Houston, Physics.
 VANDIVER, HARRY S., Austin, Mathe-
 matics.

UTAH

Predoctoral

CHRISTIANSEN, JERALD N., Logan, Engi-
 neering.
 EDWARDS, W. FARRELL, Farmington,
 Physics.
 GRANT, DAVID M., Salt Lake City, Chem-
 istry.
 HAHNE, GERHARD E., Salt Lake City,
 Physics.
 PINCOCK, RICHARD E., Ogden, Chemistry.

VERMONT

Predoctoral

WEBER, ROBERT, South Burlington, Phys-
 ics.

VIRGINIA

Predoctoral

BOBERG, THOMAS C., Falls Church, Engi-
 neering.
 BOYDEN, JAMES H.,¹ Wytheville, Physics.
 CAMPBELL, DONALD R., Charlottesville,
 Chemistry.
 FIELD, PETER B., Falls Church, Psychol-
 ogy.

GEORGE, MELVIN D., Arlington, Mathe-
 matics.
 JENKINS, W. TERRY, Yorktown, Bio-
 chemistry.
 LYON, RICHARD K., Arlington, Chemistry.
 PUBOLS, BENJAMIN H., Jr., Arlington,
 Psychology.
 REESE, MILLARD G., Jr., Dinwiddie,
 Chemistry.
 REID, DONALD L., Proffit, Engineering.
 ZUCHELLI, ARTLEY J., Jr., Charlottesville,
 Physics.

Postdoctoral

DUFORT, ROBERT H., Richmond, Psy-
 chology.

WASHINGTON

Predoctoral

ANEX, BASIL G., Seattle, Chemistry.
 BOZAK, RICHARD E., Aberdeen, Chemis-
 try.
 BROWN, RONALD E., Everett, Physics.
 BURK, HAROLD W., Tacoma, Psychology.
 CHANG, DAVID B., Seattle, Physics.
 COLE, DALE W., Everett, Agriculture.
 CRAVEN, JAMES M., Seattle, Chemistry.
 FERNEA, ROBERT A., Vancouver, Anthro-
 pology.
 FLUHARTY, ARVAN L., Seattle, Biochem-
 istry.
 GOSE, EARL E., Aberdeen, Engineering.
 HARMON, KENNETH M., Seattle, Chem-
 istry.
 KAUTZ, BETTY J., Mercer Island, Zoology.
 KING, JAMES R., Pullman, Zoology.
 MANWELL, CLYDE P., Friday Harbor,
 Zoology.
 MERCHANT, HOWARD C., Bothell, Engi-
 neering.
 METZ, PETER R., Seattle, Engineering.
 MINTON, ROBERT G., Seattle, Chemistry.
 RAGLE, JOHN LINN, Pullman, Chemistry.
 RUPLEY, JOHN A., Seattle, Biochemistry.
 SAGLE, ARTHUR A., Seattle, Mathematics.
 SEEDS, ROBERT B., Vancouver, Engineer-
 ing.
 WARE, JUDITH C., Vancouver, Chemistry.
 WILSON, LAURENCE E., Seattle, Chem-
 istry.

¹ Declined.

Postdoctoral

VANCE, JOSEPH A., Seattle, Earth Sciences.

Senior Postdoctoral

SCHMIDT, FRED H.,¹ Seattle, Physics.

WEST VIRGINIA

Predoctoral

CAZIN, JOHN, Jr., Follansbee, Microbiology.

WISCONSIN

Predoctoral

BACH, MICHAEL K., Madison, Biochemistry.

BLATTNER, ROBERT J., Milwaukee, Mathematics.

BOWMAN, ROBERT E., Madison, Psychology.

BROWN, RICHARD I., Milwaukee, Physics.

CUMMISFORD, PATRICIA D., Milwaukee, Medical Science.

DARLING, STEPHEN D.,¹ Appleton, Chemistry.

FRAUTSCHI, STEVEN C., Madison, Physics.

HORGAN, JAMES D., Madison, Engineering.

HOUGEN, JON T., Madison, Chemistry.

JACOB, RICHARD L., Ripon, Physics.

KREMBS, GEORGE M., Merrill, Engineering.

LAUDON, RICHARD B., Waunakee, Earth Sciences.

LUNDBERG, RAYMOND E., Lacrosse, Engineering.

MARDEN, ALBERT, Milwaukee, Mathematics.

MERTZ, ROBERT L., Milwaukee, Engineering.

MEYER, RICHARD T., Madison, Chemistry.

REIBEL, SAMUEL F., Madison, Microbiology.

RIESE, JEROME W., Kaukauna, Physics.

ROESLER, FREDERICK L., Wauwatosa, Physics.

WALECKA, JOHN D., Wauwatosa, Physics.

WEART, WENDELL D., Madison, Earth Sciences.

WERTHAMER, N. RICHARD,¹ Milwaukee, Physics.

Postdoctoral

FRENCH, GILBERT M., Madison, Psychology.

WYOMING

Predoctoral

DEFPEYES, KENNETH S., Casper, Earth Sciences.

KLEINDIENST, MAXINE R., Superior, Anthropology.

TALBERT, WILLARD L., Jr., Casper, Physics.

Senior Postdoctoral

RHOADS, SARA JANE, Laramie, Chemistry.

HAWAII

Predoctoral

MURASHIGE, TOSHIO, Hilo, Botany.

Senior Postdoctoral

MASON, LEONARD E., Honolulu, Anthropology.

¹ Declined.

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Acadia University, Wolfville, Nova Scotia	1	-----
Adelbert College at Western Reserve University, Cleveland, Ohio	1	1
Alabama Polytechnic Institute, Auburn, Ala	1	-----
Albion College, Albion, Mich	2	-----
Amarillo Junior College, Amarillo, Tex	1	-----
American University, Washington, D. C	-----	1
Amherst College, Amherst, Mass	3	-----
Antioch College, Yellow Springs, Ohio	2	-----
Asheville-Biltmore College, Asheville, N. C	1	-----
Atlantic Union College, South Lancaster, Mass	1	-----
Augustana College, Rock Island, Ill	1	-----
Bakersfield College, Bakersfield, Calif	2	-----
Balliol College, Oxford, England	-----	1
Barnard College, New York, N. Y	4	-----
Bates College, Lewiston, Maine	2	-----
Bethel College, North Newton, Kans	1	-----
Birmingham-Southern College, Birmingham, Ala	1	-----
Birmingham University, Birmingham, England	-----	3
Boston University, Boston, Mass	-----	1
Bowling Green State University, Bowling Green, Ohio	1	2
Bradford Durfee Technical Institute, Fall River, Mass	1	-----
Bradley University, Peoria, Ill	1	-----
Brandeis University, Waltham, Mass	1	-----
Brigham Young University, Provo, Utah	2	2
Bristol University, Bristol, England	1	-----
Brookhaven National Laboratory, Upton, Long Island, N. Y	-----	1
Brooklyn College, Brooklyn, N. Y	11	-----
Brown University, Providence, R. I	4	9
California Institute of Technology, Pasadena, Calif	20	45
Calvin College, Grand Rapids, Mich	2	-----
Cambridge University, Cambridge, England	1	13
Capital University, Columbus, Ohio	1	-----
Carleton College, Northfield, Minn	7	-----
Carnegie Institute of Technology, Pittsburgh, Pa	23	13
Case Institute of Technology, Cleveland, Ohio	4	1
Cedar Crest College, Allentown, Pa	1	-----
Central College, Pella, Iowa	1	-----
Central Washington College of Education, Ellensburg, Wash	1	-----
Champlain College, Plattsburg, N. Y	1	-----
Charles University, Prague, Czechoslovakia	-----	1
Chatham College, Pittsburgh, Pa	1	-----
City College of San Francisco, San Francisco, Calif	1	-----
Claremont Graduate School, Claremont, Calif	-----	1
Clarion State Teachers College, Clarion, Pa	1	-----
Clark University, Worcester, Mass	1	-----
Colby College, Waterville, Maine	1	-----

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Colgate University, Hamilton, N. Y.-----	1	-----
College of the City of New York, New York, N. Y.-----	17	1
College of France, Paris, France-----	-----	1
College of Puget Sound, Tacoma, Wash-----	1	-----
College of the Sequoias, Visalia, Calif-----	1	-----
College of William and Mary, Williamsburg, Va-----	3	-----
College of Wooster, Wooster, Ohio-----	3	-----
Colorado A. and M. College, Fort Collins, Colo-----	2	-----
Colorado College, Colorado Springs, Colo-----	2	-----
Colorado School of Mines, Golden, Colo-----	2	-----
Columbia University, New York, N. Y.-----	16	48
Concordia College, Moorhead, Minn-----	1	-----
Connecticut College for Women, New London, Conn-----	1	-----
Cornell University, Ithaca, N. Y.-----	31	28
Dartmouth College, Hanover, N. H.-----	2	-----
Davidson College, Davidson, N. C.-----	1	-----
Deep Springs College, Deep Springs, Calif-----	3	-----
De Paul University, Chicago, Ill-----	1	-----
De Pauw University, Greencastle, Ind-----	2	-----
Dickinson College, Carlisle, Pa-----	1	-----
Drexel Institute of Technology, Philadelphia, Pa-----	6	-----
Duke University, Durham, N. C.-----	4	12
Edinburgh University, Edinburgh, Scotland-----	1	1
El Camino College, El Camino, Calif-----	1	-----
Emory University, Emory University, Ga-----	1	2
Everett Junior College, Everett, Wash-----	1	-----
Florida State University, Tallahassee, Fla-----	1	3
Fordham University, New York, N. Y.-----	1	-----
Franklin and Marshall College, Lancaster, Pa-----	5	-----
Georgetown University, Washington, D. C.-----	1	-----
George Washington University, Washington, D. C.-----	3	2
Georgia Institute of Technology, Atlanta, Ga-----	1	-----
Gettysburg College, Gettysburg, Pa-----	1	-----
Glendale College, Glendale, Calif-----	1	-----
Grand Rapids Junior College, Grand Rapids, Mich-----	1	-----
Grays Harbor Junior College, Aberdeen, Wash-----	2	-----
Grinnell College, Grinnell, Iowa-----	1	-----
Hamline University, St. Paul, Minn-----	1	-----
Hanover College, Hanover, Ind-----	1	-----
Harvard University, Cambridge, Mass-----	36	126
Haverford College, Haverford, Pa-----	2	1
Heidelberg University, Heidelberg, Germany-----	-----	1
Herzl Junior College, Chicago, Ill-----	1	-----
Hiram College, Hiram, Ohio-----	1	-----
Howard College, Birmingham, Ala-----	1	-----
Howard University, Washington, D. C.-----	1	-----
Hunter College, New York, N. Y.-----	1	1

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Illinois Institute of Technology, Chicago, Ill	5	1
Illinois State Normal University, Normal, Ill	1	1
Immaculate Heart College, Los Angeles, Calif	1	
Imperial College, London, England		1
Indiana University, Bloomington, Ind	6	12
Institute for Advanced Study, Princeton, N. J.		12
Iowa State College, Ames, Iowa	10	12
Jackson Junior College, Jackson, Mich	1	
Jacksonville Junior College, Jacksonville, Fla	1	
Jersey City Junior College, Jersey City, N. J.	1	
Johns Hopkins University, Baltimore, Md	2	12
Joliet Junior College, Joliet, Ill	1	
Juilliard School of Music, New York, N. Y.	1	
Junior College of Kansas City, Kansas City, Mo	2	
Kalamazoo College, Kalamazoo, Mich	3	
Kansas State College, Manhattan, Kans	2	1
Kansas State Teachers College, Emporia, Kans	1	
Karolinska Institute, Stockholm, Sweden		2
Kent State University, Kent, Ohio	2	
Kentucky Wesleyan College, Winchester, Ky	1	
King College, Bristol, Tenn	1	
King's College, Newcastle Upon Tyne, England		2
Knox College, Galesburg, Ill		1
Lafayette College, Easton, Pa	1	
Lamar State College of Technology, Beaumont, Tex	1	
Lasell Junior College, Auburndale, Mass	1	
Lehigh University, Bethlehem, Pa	5	1
Long Island University, Brooklyn, N. Y.	1	
Los Angeles City College, Los Angeles, Calif	1	
Louisiana State University, Baton Rouge, La	2	1
Loyola University, Chicago, Ill	3	
Luther College, Decorah, Iowa	1	
M. T. S., Dordrecht, Holland	1	
Manchester University, Manchester, England		1
Manhattan College, New York, N. Y.	2	
Mankato State Teachers College, Mankato, Minn	1	
Marine Biological Laboratory, Woods Hole, Mass. ¹		2
Marine Station, Naples, Italy		1
Marquette University, Milwaukee, Wis	3	2
Mars Hill College, Mars Hill, N. C.	1	
Masaryk University, Brno, Czechoslovakia		1
Mason City Junior College, Mason City, Iowa	1	
Massachusetts Institute of Technology, Cambridge, Mass	35	73
Max Planck-Institute, Gottingen, Germany		2
Messiah College, Grantham, Pa	2	
Mexico City College, Mexico, DF ¹		1
Miami University, Oxford, Ohio	2	

¹ Summer session only.

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Michigan College of Mining and Technology, Houghton, Mich.	1	-----
Michigan State University, East Lansing, Mich.	1	1
Middlebury College, Middlebury, Vt. ¹	1	-----
Mississippi Southern College, Hattiesburg, Miss.	1	-----
Mississippi State College, State College, Miss.	1	-----
Montana State University, Missoula, Mont.	3	-----
Morton Junior College, Cicero, Ill.	2	-----
Hunt Holyoke College, South Hadley, Mass.	3	1
Mount St. Mary's College, Emmitsburg, Md.	2	-----
Municipal University of Wichita, Wichita, Kans.	1	-----
National Institute for Medical Research, London, England	-----	2
National Institute of Oceanography, Wormley, England	-----	1
National School of Anthropology and History, Mexico City, Mexico	-----	1
National University, Canberra, Australia	-----	1
National University of Mexico, Mexico City, Mexico	-----	2
New Jersey State Teachers College, Paterson, N. J.	1	-----
New Mexico College of Agriculture and Mechanic Arts, State College, N. Mex.	1	-----
New York University, New York, N. Y.	14	9
Nobel Institute, Stockholm, Sweden	-----	1
Norfolk Junior College, Norfolk, Nebr.	1	-----
North Carolina State College of Agriculture and Engineering, Raleigh, N. C.	1	3
Northeastern University, Boston, Mass.	2	1
Northwest Nazarene College, Nampa, Idaho	1	-----
Northwestern University, Evanston, Ill.	5	7
Oberlin College, Oberlin, Ohio	5	-----
Ohio State University, Columbus, Ohio	4	7
Ohio University, Athens, Ohio	1	-----
Ohio Wesleyan University, Delaware, Ohio	2	-----
Oklahoma A. and M. College, Stillwater, Okla.	7	6
Oregon State College, Corvallis, Oreg.	2	2
Ouachita College, Arkadelphia, Ark.	1	-----
Oxford University, Oxford, England	-----	9
Park College, Parkville, Mo.	1	-----
Parson's College, Fairfield, Iowa	1	-----
Pasadena City College, Pasadena, Calif.	1	-----
Pasteur Institute, Paris, France	-----	1
Pembroke College, Cambridge, England	-----	1
Pennsylvania State University, University Park, Pa.	7	6
Piedmont College, Demorest, Ga.	1	-----
Polytechnic Institute of Brooklyn, Brooklyn, N. Y.	5	3
Pomona College, Claremont, Calif.	8	-----
Pratt Institute, Brooklyn, N. Y.	1	-----
Princeton University, Princeton, N. J.	22	49

¹ Summer session only.

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Providence College, Providence, R. I.....	1	-----
Purdue University, Lafayette, Ind.....	11	5
Queens College, Flushing, N. Y.....	1	-----
Radcliffe College, Cambridge, Mass.....	1	9
Randolph-Macon College, Ashland, Va.....	2	-----
Reed College, Portland, Oreg.....	7	-----
Regis College, Denver Colo.....	1	-----
Rensselaer Polytechnic Institute, Troy, N. Y.....	8	-----
Rice Institute, Houston, Tex.....	4	2
Rockefeller Foundation for Medical Research, New York, N. Y.....	-----	3
Rollins College, Winter Park, Fla.....	1	-----
Roosevelt College, Chicago, Ill.....	1	-----
Royal Institute of Technology, Stockholm, Sweden.....	-----	1
Rutgers University, New Brunswick, N. J.....	3	2
Saint Benedict's College, Atchison, Kans.....	1	-----
Saint John's University, Brooklyn, N. Y.....	-----	1
Saint Joseph's College, Philadelphia, Pa.....	2	-----
Saint Lawrence University, Canton, N. Y.....	2	-----
Saint Louis University, St. Louis, Mo.....	2	1
Saint Mary's College, Notre Dame, Ind.....	2	-----
Saint Olaf College, Northfield, Minn.....	3	-----
Sampson College, Sampson, N. Y.....	1	-----
San Diego State College, San Diego, Calif.....	1	-----
San Jose State College, San Jose, Calif.....	3	-----
Santa Monica City College, Santa Monica, Calif.....	1	-----
Santa Rosa Junior College, Santa Rosa, Calif.....	1	-----
Scripps College, Claremont, Calif.....	1	-----
Scripps Institute of Oceanography, La Jolla, Calif.....	-----	2
Seton Hill College, Greensburg, Pa.....	1	-----
Shimer College, Mount Carroll, Ill.....	2	-----
Smith College, Northampton, Mass.....	1	-----
South Dakota School of Mines and Technology, Rapid City, S. Dak.....	1	-----
South Dakota State College, Brookings, S. Dak.....	1	1
Southeast Missouri State College, Cape Girardeau, Mo.....	1	-----
Southern Illinois University, Carbondale, Ill.....	2	-----
Southern Methodist University, Dallas, Tex.....	2	-----
Southwestern College, Winfield, Kans.....	2	-----
Southwestern at Memphis, Memphis, Tenn. ¹	1	-----
Spring Hill College, Spring Hill, Ala.....	1	1
Stanford University, Stanford, Calif.....	14	37
State College of Washington, Pullman, Wash.....	-----	2
State Teachers College, Dickinson, N. Dak.....	1	-----
State Teachers College, Valley City, N. Dak.....	1	-----
State University of Iowa, Iowa City, Iowa.....	2	2
State University of New York, Syracuse, N. Y.....	-----	1

¹ Summer session only.

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
Sterling College, Sterling, Kans.....	1	-----
Stevens Institute of Technology, Hoboken, N. J.....	-----	1
Stockton Junior College, Stockton, Calif.....	2	-----
Swarthmore College, Swarthmore, Pa.....	14	1
Swiss Federal Institute of Technology, Zurich, Switzerland.....	-----	5
Syracuse University, Syracuse, N. Y.....	2	4
Technical College, Karlsruhe, Germany.....	-----	1
Technische Hochschule Wien, Vienna, Austria.....	1	1
Temple University, Philadelphia, Pa.....	1	1
Texas A. and M. College, College Station, Tex.....	2	1
Trinity College, Hartford, Conn.....	1	-----
Trinity University, San Antonio, Tex.....	1	-----
Truett-McConnell Junior College, Cleveland, Ga.....	1	-----
Tufts University, Medford, Mass.....	3	1
Tulane University, New Orleans, La.....	1	1
Union College and University, Schenectady, N. Y.....	1	-----
Union Junior College, Cranford, N. J.....	1	-----
USAF Institute of Technology, Dayton, Ohio.....	1	1
University of Alabama, University, Ala.....	1	-----
University of Alaska, College, Alaska.....	1	-----
University of Arizona, Tucson, Ariz.....	2	1
University of Arkansas, Fayetteville, Ark.....	5	3
University of Berne, Berne, Switzerland.....	-----	1
University of Brussels, Brussels, Belgium.....	-----	1
University of Buffalo, Buffalo, N. Y.....	1	-----
University of Calcutta, Calcutta, India.....	1	-----
University of California, Berkeley, Calif.....	36	61
University of California, Davis, Calif.....	-----	4
University of California, Los Angeles, Calif.....	7	19
University of Chicago, Chicago, Ill.....	37	59
University of Cincinnati, Cincinnati, Ohio.....	2	-----
University of Colorado, Boulder, Colo.....	10	6
University of Connecticut, Storrs, Conn.....	1	1
University of Copenhagen, Copenhagen, Denmark.....	-----	4
University of Delaware, Newark, Del.....	2	4
University of Denver, Denver, Colo.....	1	-----
University of Detroit, Detroit, Mich.....	3	1
University of Florida, Gainesville, Fla.....	2	2
University of Freiburg, Freiburg, Germany.....	-----	1
University of Geneva, Geneva, Switzerland.....	-----	1
University of Gottingen, Gottingen, Germany.....	-----	3
University of Graz, Graz, Austria.....	-----	1
University of Hamburg, Hamburg, Germany.....	-----	1
University of Hawaii, Honolulu, T. H.....	1	1
University of Idaho, Moscow, Idaho.....	1	1
University of Illinois, Urbana, Ill.....	14	37

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
University of Kansas, Lawrence, Kans.....	1	6
University of Kansas City, Kansas City, Mo.....	2	-----
University of Kentucky, Lexington, Ky.....	2	2
University of Leeds, Leeds, England.....	-----	1
University of Leyden, Leyden, Netherlands.....	-----	2
University of Liege, Liege, Belgium.....	-----	1
University of London, London, England.....	-----	8
University of Lund, Lund, Sweden.....	-----	1
University of Maine, Orono, Maine.....	2	-----
University of Mainz, Mainz, Germany.....	-----	1
University of Maryland, College Park, Md.....	1	4
University of Massachusetts, Amherst, Mass.....	1	1
University of Michigan, Ann Arbor, Mich.....	15	36
University of Michigan Biological Station, Douglas Lake, Mich. ¹	-----	1
University of Minnesota, Minneapolis, Minn.....	15	21
University of Mississippi, University, Miss.....	1	-----
University of Missouri, Columbia, Mo.....	4	3
University of Munich, Munich, Germany.....	-----	1
University of Nebraska, Lincoln, Nebr.....	5	4
University of New Hampshire, Durham, N. H.....	2	1
University of New Mexico, Albuquerque, N. Mex.....	4	2
University of North Carolina, Chapel Hill, N. C.....	6	3
University of North Dakota, Grand Forks, N. Dak.....	1	-----
University of Notre Dame, Notre Dame, Ind.....	4	-----
University of Oklahoma, Norman, Okla.....	5	3
University of Omaha, Omaha, Nebr.....	1	-----
University of Oregon, Eugene, Oreg.....	4	1
University of Palermo, Palermo, Sicily.....	-----	1
University of Paris, Paris, France.....	-----	4
Univ. of Pennsylvania, Philadelphia, Pa.....	10	9
University of Pittsburgh, Pittsburgh, Pa.....	-----	3
University of Richmond, Richmond, Va. ¹	1	-----
University of Rochester, Rochester, N. Y.....	11	5
University of Sheffield, Sheffield, England.....	-----	1
University of the South, Sewanee, Tenn.....	2	-----
University of Tennessee, Knoxville, Tenn.....	1	1
University of Texas, Austin, Tex.....	3	9
University of Tulsa, Tulsa, Okla.....	2	1
University of Upsala, Upsala, Sweden.....	-----	1
University of Utah, Salt Lake City, Utah.....	3	2
University of Utrecht, Utrecht, Netherlands.....	-----	1
University of Vermont, Burlington, Vt.....	1	-----
University of Virginia, Charlottesville, Va.....	5	4
University of Washington, Seattle, Wash.....	10	15
University of Wisconsin, Madison, Wis.....	10	36

¹ Summer session only.

Institutions Attended by NSF Fellows as Undergraduates and Graduate Students, 1956-57—Continued

<i>Institution and location</i>	<i>Number of fellows attending—</i>	
	<i>As under-graduates</i>	<i>As graduate students</i>
University of Wyoming, Laramie, Wyo.....	1	-----
University of Zurich, Zurich, Switzerland.....	-----	2
Utah State Agricultural College, Logan, Utah.....	2	1
Vanderbilt University, Nashville, Tenn.....	3	3
Virginia Polytechnic Institute, Blacksburg, Va.....	3	-----
Wabash College, Crawfordsville, Ind.....	1	-----
Wartburg College, Waverly, Iowa.....	1	-----
Washington and Jefferson College, Washington, Pa.....	1	-----
Washington University, St. Louis, Mo.....	1	9
Wayne University, Detroit, Mich.....	1	1
Webb Institute of Naval Architecture and Marine Engineering, Glen Cove, N. Y.....	1	-----
Wellesley College, Wellesley, Mass.....	3	1
Wells College, Aurora, N. Y.....	1	-----
Wesleyan University, Middletown, Conn.....	8	-----
West Texas State Teachers College, Canyon, Tex.....	1	-----
Western Carolina Teachers College, Cullowhee, N. C.....	1	-----
Western Kentucky State College, Bowling Green, Ky.....	1	-----
Western Michigan College, Kalamazoo, Mich.....	1	-----
Western Reserve University, Cleveland, Ohio.....	1	2
Western Washington College of Education, Bellingham, Wash.....	1	-----
Wheaton College, Wheaton, Ill.....	3	-----
Whitman College, Walla Walla, Wash.....	1	-----
Wilkes College, Wilkes-Barre, Pa.....	1	-----
Willamette University, Salem, Oreg.....	1	-----
Williams College, Williamstown, Mass.....	2	-----
Wilson College, Chambersburg, Pa.....	2	-----
Winona State Teachers College, Winona, Minn.....	1	-----
Wisconsin State College, Superior, Wis.....	1	-----
Wittenberg College, Springfield, Ohio.....	1	-----
Worcester Polytechnic Institute, Worcester, Mass.....	1	-----
Wright Junior College, Chicago, Ill.....	1	-----
Xavier University, Cincinnati, Ohio.....	2	-----
Yale University, New Haven, Conn.....	26	38
Yeshiva University, New York, N. Y.....	1	1
York Junior College, York, Pa.....	1	-----
Youngstown University, Youngstown, Ohio.....	1	-----

APPENDIX E

Grants for the International Geophysical Year Program Made During Fiscal Year 1956

AURORA AND AIRGLOW

<i>Air Force Cambridge Research Center</i>	
Procurement of Patrol Spectrographs.....	\$157,400
Procurement of Scanning Spectrometers.....	24,300
Operation of Six-Station Antarctic Aurora and Airglow Network....	12,025
Operations at Sacramento Peak and Tonanzintla, Mexico.....	1,000
Operations at Thule, Greenland.....	2,950
Support of Cooperative Auroral Measurements in New Zealand....	3,350
Auroral Observations on Arctic Ice Floe and at Sachs Harbor, Canada.....	2,950
<i>Arctic Institute of North America</i>	
Operation of Six-Station Antarctic Aurora and Airglow Network....	94,000
<i>Cornell University</i>	
Visual Aurora Observation Program.....	4,600
<i>National Bureau of Standards</i>	
Procurement of Recording Photometers.....	28,000
<i>Stanford University</i>	
Meteor Radar Observations in the Antarctic.....	2,000
<i>University of Alaska</i>	
Construction of All-Sky Cameras.....	83,863
Procurement of Auroral Radar Equipment for Auroral Observa- tions.....	113,850

COSMIC RAYS

<i>Bartol Research Foundation</i>	
Shipboard Neutron Monitor Station.....	13,000
<i>California Institute of Technology</i>	
Balloon Flights with Ionization Chambers.....	6,900
<i>New York University</i>	
Construction and Operation of Neutron Monitor in Alaska.....	20,700
Counter Studies of Spectrum of Primary Cosmic Radiation and Its Time Variations.....	4,600
Search for Neutrons of Solar Origin.....	4,600
<i>State University of Iowa</i>	
Solar Effects on Cosmic Rays at High Altitude in the Arctic.....	9,000
<i>University of California</i>	
Construction and Operation of Air Shower Detectors.....	10,700
Time Variations of Neutron, Hard, and Soft Cosmic Ray Compon- ents.....	18,600
<i>University of Chicago</i>	
Measurements of Neutron Intensity from Icebreaker in the Antarctic	27,200
Measurements of Composition and Intensity of Primary Cosmic Radiations.....	22,050
Study of the Isotopic Constitution of Cosmic Radiation at Balloon Altitudes.....	4,300

University of Maryland

Construction and Operation of a Cosmic Ray Monitor Telescope in the Antarctic.....	\$40,800
Construction and Operation of a Cosmic Ray Monitor Telescope in the Arctic.....	19,550

University of Minnesota

Measurement of Cosmic Ray Intensity at High Altitudes.....	120,550
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University of Nebraska

Atmospheric, Geomagnetic, and Solar Influences on the Mu-Meson Component of Cosmic Radiation.....	7,860
Atmospheric, Geomagnetic, and Solar Influences on the Nucleonic Components of Cosmic Radiation.....	14,725

University of New Mexico

Studies of the Semi-Diurnal Planetary Variation of Atmospheric Pressure.....	10,000
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Yagoda

Study of Low-Energy, Heavy Primary Cosmic Rays Near Mag- netic Poles.....	900
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GEOMAGNETISM

Air Force Cambridge Research Center

Sub-Audiot-Frequency Geomagnetic Fluctuations.....	50,000
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United States Coast and Geodetic Survey

Operation of Geomagnetism Headquarters.....	55,000
Operation of Magnetic Observatories at Three Antarctic Stations.....	108,500
Operation of Western Pacific Magnetic Observatories.....	120,000
Operation of East-West United States Geomagnetic Network.....	84,000
Operation of North-South Alaska Geomagnetic Network.....	75,000
Magnetic Gradient Studies at McKinley Park and Big Delta, Alaska.....	87,000
Operation of Magnetic Observatory at College, Alaska.....	177,000
Operation of Rapid-Run Auxiliary Magnetographs.....	76,000
Procurement and Operation of Visible-Recording Magnetic Vario- meters.....	25,000
Equipment for Jarvis and Palmyra Magnetic Stations.....	48,500
Operations at Antarctic Knox Coast Station.....	40,000
Equipment for Antarctic Cape Adare Magnetic Station.....	11,700
Equipment for Arctic Ice Floe Magnetic Station.....	15,500

University of California, Scripps Institution of Oceanography

Operations at Jarvis and Palmyra Islands.....	30,000
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GLACIOLOGY

American Geographical Society

Glacier Observations in Southern Alaska.....	8,575
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Arctic Institute of North America

Procurement of Antarctic Glaciological Equipment.....	19,900
Glaciological Personnel.....	210,650
Operation of the Glaciological Headquarters.....	19,250
Glaciological Program, Mount Michelson, Alaska.....	14,385
Arctic Sea Ice Physics.....	9,500

Army, Corps of Engineers

Antarctic Deep Drilling Program.....	30,600
Procurement of Antarctic Glaciological Equipment.....	43,400

<i>University of Washington</i>	
Glacial Meteorology, Blue Glacier-----	\$11, 240

GRAVITY MEASUREMENTS

<i>Arctic Institute of North America</i>	
Traverse Personnel-----	53, 760
<i>Boston College</i>	
Procurement of a Gravimeter for the Antarctic-----	9, 050
<i>California Institute of Technology</i>	
Procurement of a Gravimeter for the Antarctic-----	9, 050
<i>Columbia University</i>	
Procurement of a Gravimeter for the Antarctic-----	9, 050
Submarine Pendulum Measurements of Gravity-----	28, 910
Submarine Gravity Measurements-----	5, 000
<i>University of California</i>	
Measurement of Mean Rigidity of the Earth-----	8, 400
<i>University of Wisconsin</i>	
Antarctic Pendulum Measurements of Gravity-----	11, 400
Procurement of a Gravimeter for the Antarctic-----	9, 050
<i>Woods Hole Oceanographic Institution</i>	
Pendulum Measurement of Gravity-----	10, 000

IONOSPHERIC PHYSICS

Dartmouth College

Atmospheric Whistler Program, Eastern Area-----	15, 000
<i>National Bureau of Standards</i>	
Procurement of Vertical Incidence Ionospheric Sounders-----	81,700
Cooperative Operation of Huancayo Sub-Center and Two Peruvian Stations-----	55, 400
Operation of Antarctic Six-Station Ionospheric Network-----	311, 200
Cooperative Operation of South American Ionospheric Stations--	85, 400
Personnel Training and Data Quality Control-----	103, 870
Equatorial VHF Ionospheric Forward-Scatter Measurements-----	263, 000
Radio Noise Measurement-----	86, 300
Oblique-Incidence Sporadic-E Layer Measurements-----	116, 300
Equipment for Arctic Ice Floe Ionospheric Station-----	18, 100
<i>Stanford University</i>	
Atmospheric Whistler Program, Western Area-----	2, 000
Fixed Frequency Back Scatter Measurements-----	167, 700
<i>University of Virginia</i>	
Radio Star Scintillation and Atmospheric Winds-----	25, 000

METEOROLOGY

<i>United States Weather Bureau</i>	
Operation of Antarctic Six-Station Meteorological Network-----	656, 110
Cooperative Operation of South American Upper Air Observation Stations-----	434, 200
Operation of Antarctic Weather Central-----	44, 930
Antarctic Atmospheric Geochemical Measurements of Carbon Dioxide and Surface Ozone-----	42, 275

OCEANOGRAPHY

<i>Columbia University</i>	
Operation of Atlantic Oceanographic Island Observatories.....	\$92, 800
Deep Current Program, Atlantic.....	23, 380
CO ₂ Analysis and Radiochemistry of Sea Water.....	30, 000
<i>Navy, Bureau of Ships</i>	
Procurement of Bathythermographs.....	15, 000
<i>Navy, Hydrographic Office</i>	
Photographic Reconnaissance of Arctic Sea Ice.....	32, 000
<i>University of California, Scripps Institution of Oceanography</i>	
Operation of Pacific Island Oceanographic Observatories.....	34, 500
Deep Current Program, Pacific Ocean.....	22, 420
CO ₂ Analysis and Radiochemistry of Sea Water.....	30, 000
<i>Texas Agricultural and Mechanical College</i>	
Deep Current Program, Atlantic.....	2, 070
CO ₂ Analysis and Radiochemistry of Sea Water.....	21, 000
<i>University of Washington</i>	
CO ₂ Analysis of Sea Water.....	10, 000
Operation of North Pacific Island Oceanographic Observatories.....	5, 300
Deep Current Program, North Pacific.....	8, 050
<i>Woods Hole Oceanographic Institution</i>	
Deep Current Program, Atlantic.....	11, 180
CO ₂ Analysis and Radiochemistry of Sea Water.....	21, 000
Arctic Oceanography.....	20, 000

ROCKETRY

<i>Air Force Cambridge Research Center</i>	
Air Force Cambridge Research Center Aerobee Rocket Program at Fort Churchill, Canada.....	70, 000
<i>Army, Signal Corps</i>	
Meteorological Support for Fort Churchill Rocket Program.....	12, 000
Rocket Program at Guam.....	184, 500
Signal Corps Engineering Laboratories Aerobee Rocket Program at Fort Churchill, Canada.....	113, 000
<i>Navy, Naval Research Laboratory</i>	
Rocket Program in the Pacific San Diego High Area.....	54, 000
Naval Research Laboratory Aerobee Rocket Program at Fort Churchill, Canada.....	154, 000
Rocket Program in the Antarctic.....	50, 000
Contractor Services for Fort Churchill Rocket Program.....	95, 800
<i>Navy, Ballistics Research Laboratory</i>	
Ballistics Research Laboratories Aerobee Rocket Program at Fort Churchill, Canada.....	90, 000
<i>State University of Iowa</i>	
Rocket Program in the Arctic.....	183, 000
Rocket Program in the Antarctic.....	155, 000

SEISMOLOGY

<i>Arctic Institute of North America</i>	
Personnel for Antarctic Stations and Traverse Parties.....	140, 070
<i>Boston College</i>	
Procurement of Antarctic Seismographic Equipment.....	23, 550

California Institute of Technology

Procurement of Antarctic Seismographic Equipment.....	\$36,750
Study of Crustal Strain Accumulation.....	11,500

Columbia University

Procurement of Antarctic Seismographic Equipment.....	17,775
Seismic Exploration of Atlantic Ocean.....	20,980
Study of Long Period Seismic Waves.....	62,100
Study of Lg Phase.....	13,800
Arctic Seismology.....	11,500

University of Wisconsin

Procurement of Antarctic Seismographic Equipment.....	23,550
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United States Coast and Geodetic Survey

Antarctic Teleseismic Measurements.....	14,500
Arctic Seismograph Measurements.....	11,500
Pacific Island Seismograph Measurements.....	12,000

SOLAR ACTIVITY

Air Force Cambridge Research Center

Procurement of Flare Patrol Equipment for Sacramento Peak.....	9,000
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High Altitude Observatory

Procurement of Flare Patrol Equipment.....	25,000
Supervision of Hawaiian Flare Patrol Program.....	5,000

Navy, Naval Research Laboratory

Procurement of Flare Patrol Instrument and Filters.....	81,000
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Rensselaer Polytechnic Institute

Indirect Flare Detection Instrumentation.....	2,000
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University of Hawaii

Solar Radio Noise Patrol.....	7,250
Solar Activity Flare Patrol.....	5,000

EARTH SATELLITE

Air Force Cambridge Research Center

Instrumentation for Detection of Extreme Ultraviolet Solar Radiation.....	1,000
Measurement of Interplanetary Matter from the Earth Satellite.....	89,045

Army, Signal Corps Engineering Laboratories

Meteorological Observations from the Earth Satellite.....	35,000
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National Academy of Sciences

Scientific Coordination of Earth Satellite Program.....	50,000
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Navy, Naval Research Laboratory

Earth Satellite Launching-Propulsion Vehicles.....	5,800,000
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Smithsonian Institution

Optical Tracking Program Study.....	49,910
Development of Prototype Optical Tracking Equipment.....	125,000
Installation and Supervision of Optical Tracking Stations.....	923,100
Operation of Optical Tracking Stations.....	39,100
Visual Observing Program.....	24,000
Operation of Optical Tracking Analysis Center.....	63,200
Administrative Costs of Optical Tracking Program.....	50,600

State University of Iowa

Earth Satellite Instrumentation.....	59,685
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NATIONAL SCIENCE FOUNDATION

RELATED SCIENTIFIC SUPPORT

<i>American Geographical Society</i>	
Construction of Antarctic Map-----	\$8,500
<i>National Academy of Sciences</i>	
Coordination and Editorial Offices, International Special Committees-----	20,000
Staff Study of United States World Data Center Establishment----	30,100
Support of the United States National Committee-----	289,000
<i>United States Weather Bureau</i>	
Antarctic Planning Staff-----	85,234
Procurement of Miscellaneous Supplies for Antarctic Bases-----	54,340
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Total-----	14,789,817

APPENDIX F

Financial Report for Fiscal Year 1956

SALARIES AND EXPENSES APPROPRIATION¹

Receipts

Appropriation for fiscal year 1956.....	\$16,000,000	
Unobligated balance from fiscal year 1955.....	166,671	
Appropriation reimbursements.....	15,851	
Total.....		\$16,182,522

Obligations

National science policy studies.....	679,933	
Support of science:		
Grants for support of research projects:		
Biological and medical sciences.....	4,793,129	
Mathematical, physical, and engineering sciences.....	4,698,689	
Grants for support of research facilities:		
Biological and medical sciences.....	125,000	
Mathematical, physical, and engineering sciences.....	397,500	
Grants for training of scientific manpower:		
Graduate fellowships.....	2,131,026	
Education in the sciences.....	1,434,275	
National Committee for Development of Scientists and Engineers.....	10,000	
Review of research and training.....	738,165	
Subtotal.....	14,327,784	
Scientific information exchange:		
Dissemination of scientific information.....	510,318	
Attendance at international meetings.....	46,043	
Subtotal.....	556,361	
Executive direction and management.....	503,651	
Total obligations.....		16,067,729
Unobligated balance carried forward to fiscal year 1957.....		114,793

¹ Does not include adjustments made subsequent to June 30, 1956, in accordance with Section 1311, Public Law 663, 83d Congress, approved August 26, 1954.

INTERNATIONAL GEOPHYSICAL YEAR APPROPRIATION²*Receipts*

Appropriation for fiscal year 1956.....	\$37,000,000	
Unobligated balance from fiscal year 1955.....	77,529	
Total.....		\$37,077,529

Obligations

Technical program.....	14,574,317	
Administrative expense, National Academy of Sciences- National Research Council.....	281,598	
Administrative expense, National Science Foundation.....	48,678	
Total.....		14,904,593
Unobligated balance carried forward to fiscal year 1957.....		22,172,936

SYNTHETIC RUBBER RESEARCH PROGRAM

Receipts

Transfer from Federal Facilities Corporation.....	\$2,227,000
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Obligations

Research.....	\$1,843,817	
Administrative.....	64,591	
Total.....	1,908,408	
Less income from laboratories.....	262,587	
Net obligations.....		1,645,821
Unobligated balance.....		581,179

TRUST FUND

Receipts

Unobligated balance from fiscal year 1955.....	\$1,406	
Donations from private sources.....	1,550	
Total.....		2,956

Obligations

Unobligated balance carried forward to fiscal year 1957.....	2,956
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MISCELLANEOUS FUNDS

During the fiscal year the amount of \$152,046 was received from Government agencies participating in Foundation activities. This amount has been obligated.

² Does not include adjustments made subsequent to June 30, 1956, in accordance with Section 1311, Public Law 663, 83d Congress, approved August 26, 1954.

APPENDIX G

Publications of the National Science Foundation

ANNUAL REPORTS

In January of each year the National Science Foundation issues an annual report of activities covering the previous fiscal year ending on June 30. The annual reports are made available to the public through the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at nominal prices.

NATIONAL SCIENCE STUDIES SERIES

This series of reports contains data on scientific research and development. The series is largely the presentation of the data collected to determine the extent and nature of research and development in the country as a whole. However, in this series are also included special studies relating to other phases of scientific research and development. The reports may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Scientific Research Expenditures by the Larger Private Foundations. 25 cents.

Science and Engineering in American Industry. Preliminary Report. 30 cents.

Research by Cooperative Organizations. 35 cents.

FEDERAL FUNDS FOR SCIENCE SERIES

These reports contain information on the Federal research and development budget. Such information is compiled on a current basis by the National Science Foundation with the cooperation of other Federal agencies having research and development programs. The most recent report in the series may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

IV. The Federal Research and De-

velopment Budget, Fiscal Years, 1954, 1955, and 1956. 30 cents.

SCIENTIFIC MANPOWER SERIES

The Scientific Manpower Series consists of reports on the supply and characteristics of scientific and technological manpower in various fields of science. The reports were based originally upon data developed through the registration program of the National Scientific Register, which functioned under the policy and fiscal direction of the National Science Foundation and was operated by the Federal Security Agency, Office of Education. Following the transfer of registration operations to the Foundation the reports were continued in cooperation with the United States Department of Labor, Bureau of Labor Statistics. These reports may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Research and Development Personnel in Industrial Laboratories 1950. 15 cents.

The Composition of the Sanitary Engineering Profession. 15 cents.

Manpower Resources in Physics 1951. 20 cents.

Manpower Resources in Chemistry and Chemical Engineering. 50 cents.

Manpower Resources in Mathematics. 20 cents.

Manpower Resources in the Earth Sciences. 45 cents.

Manpower Resources in the Biological Sciences. 40 cents.

Education and Employment Specialization in 1952 of June 1951 College Graduates. 35 cents.

SCIENTIFIC MANPOWER BULLETINS

This series of four-page leaflets was also established as a means for releasing

scientific manpower information gathered in connection with the scientific registration program. Copies of *Bulletins* still in print may be obtained upon request from the Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.

Manpower Resources in Chemistry, 1951.

Manpower Resources in Physics, 1951.

Manpower Resources in Chemical Engineering, 1951.

Military Status and Selective Service Classification of June 1951 College Graduates.

Manpower Resources in Geology, 1951.

Manpower Resources in Psychology, 1951.

Manpower Resources in Mathematics, 1951.

Highlights of a Survey of June 1951 College Graduates.

Manpower Resources in the Geophysical Sciences.

Manpower Resources in Meteorology, 1951.

Highlights of a Survey of Graduate Student Enrollments, Fellowships, and Assistantships, 1954.

Shortages of Scientists and Engineers in Industrial Research.

PROCEEDINGS OF CONFERENCES ON SCIENTIFIC MANPOWER

Since December 1951, the National Science Foundation has sponsored an annual conference on scientific manpower in conjunction with the annual meetings of the American Association for the Advancement of Science. In view of the widespread interest in these meetings a limited number of processed copies of the *Proceedings* have been issued. Copies of *Proceedings* still in print may be obtained upon request from the Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D.C.

I. Philadelphia, December 1951.

II. St. Louis, December 1952.

III. Boston, December 1953.

IV. Berkeley, December 1954.

OTHER SCIENTIFIC MANPOWER AND EDUCATION REPORTS

Trends in the Employment and Training of Scientists and Engineers.

Scientific Personnel Resources. 50 cents.

SCIENCE INFORMATION EXCHANGE

In connection with its program for exchange of scientific information the National Science Foundation has published or sponsored the publication of material of interest to American scientists and scientific librarians.

List of International and Foreign Scientific and Technical Meetings. Quarterly. May be ordered from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Subscription price: \$1 per year, domestic; \$1.25 per year, foreign. Single copy price: 25 cents.

Bibliography of Translations from Russian Scientific and Technical Literature. Monthly. May be ordered from the Card Division, Library of Congress, Washington 25, D. C. Subscription price: \$3 per year. Single copy price: 25 cents.

Scientific and Technical Serial Publications. United States, 1950-53. Compiled by Library of Congress. May be ordered from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. \$1.25.

Soviet Science. A symposium presented on December 27, 1951, at the Philadelphia meeting of the American Association for the Advancement of Science. May be ordered from American Association for the Advancement of Science, 1515 Massachusetts Avenue NW., Washington 5, D. C. \$1.

Soviet Professional Manpower—Its Education, Training, and Supply, by Nicholas DeWitt. May be ordered from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. \$1.25.

Soviet Physics, A Translation of the Journal of Experimental and Theoretical Physics of the Academy of Sciences of the U. S. S. R. May be ordered from the

American Institute of Physics, 57 East 55th Street, New York 22, N. Y. Subscription price: \$30 per year, 6 issues, United States and Canada; \$32 per year elsewhere. Single copy price: \$6.

National Science Foundation Translations of Russian Reports in Physics from Doklady Akademii Nauk SSSR. May be ordered from Office of Technical Services, Department of Commerce, Washington 25, D. C. 10 cents each. A list of the NSF translations for sale is available on request from the Office of Technical Services.

RECOMMENDED FUTURE ROLE OF THE FEDERAL GOVERNMENT WITH RESPECT TO RESEARCH IN SYNTHETIC RUBBER

This report was prepared by the Special Commission for Rubber Research, National Science Foundation. Out of print.

GRANTS FOR SCIENTIFIC RESEARCH

A guide for the submission of research proposals and the administration of National Science Foundation research grants.

FELLOWSHIP ANNOUNCEMENTS

Semiannual announcements of the National Science Foundation fellowships with instructions for applying.

COMMITTEES

These publications describe the activities of two committees established by Executive Order with staff services provided by the National Science Foundation. The publications may be obtained from the Public Information Office, National Science Foundation, Washington 25, D. C.

The Interdepartmental Committee on Scientific Research and Development.

The National Committee for the Development of Scientists and Engineers.