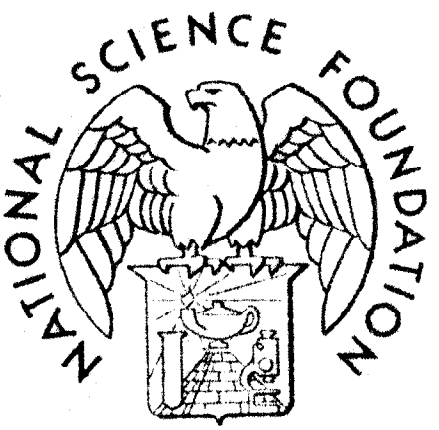
National Science Foundation

7th *Annual Report, 1957*



NSF-58-1

National Science Foundation

Seventh Annual Report for the Fiscal Year Ended June 30, 1957

LETTER OF TRANSMITTAL

WASHINGTON, D. C.,
January 15, 1958.

MY DEAR MR. PRESIDENT:

I have the honor to transmit herewith the Annual Report for Fiscal Year 1957 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.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $1

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THE CHAIRMAN'S FOREWORD

The National Science Foundation has a deep concern and heavy responsibility for the future of scientific endeavor in the United States.

A measure of our success will be found in the strength of our Nation and the welfare of our people during coming decades. Many of our objectives are not quickly accomplished, for our primary functions are these: to improve the quality of scientific education; to enable promising youth to prepare for careers in science; to provide financial support for exploratory research which may have no discernible immediate practical usefulness; and to foster more widespread understanding of science and a congenial environment for creative scientific scholars.

The fulfillment of these objectives requires that those who provide the funds for our work have confident faith in the ultimate value of solid foundations. Our staff must be content with long deferred satisfaction in scientific discoveries made by others. We must constantly remind ourselves that the degree to which we satisfy those responsibilities will have a profound effect upon the military defenses, the economic strength, and the spiritual quality of our Nation many years from now.

If we were to be concerned only with scientific matters of obvious practical value, we should be unfaithful to our responsibilities for our Nation's future. If we were devoted only to the future, we should neglect those present needs which must be satisfied in order that our Nation may survive the perilous present. Accordingly, the Foundation recognizes a dual responsibility to marshal the scientific and technical resources of our Nation for the needs of the present and to build for the future with bold imagination.

Permeating all our concerns and efforts described in this Annual Report is devotion to the belief that the furtherance of science enriches the intellectual and spiritual life of the people of our country, broadens and deepens the quality of our culture, and ennobles our national ideals. We think of science as a great adventure of the human mind.

DETLEV W. BRONK,
Chairman, National Science Board.

One of the statutory responsibilities of the National Science Foundation is "to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences." To a considerable extent the development of such national policy is reflected directly in the programs of the National Science Foundation, notably in its support of basic research and training in science and in aiding the teaching of science. Full accounts of the development of these Foundation programs are contained in the previous six Annual Reports of the National Science Foundation to the Congress.

With increasing awareness on the part of the Federal Government and the country of the importance of national policy for science, it is appropriate to consider what one means by a "national policy" for science and to explain what such policy is.

What is science? The body of science represents the accumulated knowledge concerning the world we live in and how it operates. Increases in this body of knowledge are made by research, which is the active search to increase our understanding of nature. It is continually tested by observation and by experiment, and continually enlarged in detail, and in overall design. As science grows in scope and complexity, years of study and practice are required to perform modern research.

A traditional "policy" exists among workers in science that is as old as science itself. It is really a combination of a philosophy of science—the scientists' attitude toward their field—plus a tacit code of behavior both for the individual scientist and for his relation to his colleagues. Although a scientist would be startled and probably amused at calling this "policy," no policy for science that ignores or violates it can be tenable.

But what is this philosophy or policy concerning science? Briefly and in oversimplified form it is this. Science is man's attempt at an objective view of our universe. It is not based upon opinions, even of the world's leaders in science, but upon observations and experimental demonstrations that any compe-

tent individual can verify for himself. Each new scientific finding, even by a Nobel prize winner, is challenged and subjected to critical examination and test by others in the same field. The process is thoroughly democratic. In fact, scientific research has always been, in this sense, a "free enterprise" system. Any adequately trained research scientist may and does make his own contributions to science, which may be large or small. In fact, this is the research scientist's goal—to make an original contribution to his field of science. Note, this is an individual matter—he makes his own decision where and how to explore. Since he is a specialist, the importance and feasibility of what he wants to do and the significance of his final results can only be properly appraised and evaluated by his peers—his scientific colleagues in the same field. Now in order to attempt an original piece of work it is necessary for him to know about all other research in his special field—past, present, and planned—as far as possible. Since he and his fellow scientists are in the same boat, all strive to maintain contact with one another, directly if possible, and otherwise at conferences, by correspondence, and through papers published in the scientific journals.

What is the significance of the scientific method in terms of a national policy for basic research? It is that no agency, governmental or otherwise, can rationally attempt to formulate what individual scientists should do, and still less how they should do it. No scientific society would think of doing such a thing for its members. The scientists themselves know best what can be done and how to go about it. A national policy in pure science must, therefore, be an enlightened one—it must find out what scientists consider important to do and to see that they have the means to do it. This means wholehearted approval of providing support for competent basic research wherever needed, and in particular for the capital facilities which science needs in such fields as nuclear research, radio astronomy, and the scientific exploration of outer space. A national policy should also assist scientists by the dissemination of research reports, by providing opportunity for conferences, travel to scientific meetings, and by helping them to renew research study and personal communication with other scientists, both at home and abroad.

But, one may ask, what of the priorities of different sciences? Are not some more important than others? To this, science itself can make only one answer. No field of science should be excluded from encouragement and support. The capital discoveries in science may occur in any field. History is convincing upon this point. In fact, the more novel and far-reaching the discovery, the less one can predict where it may occur. How could one foretell the discovery of magnetism, X-rays, helium, or cosmic rays in advance, before knowing of their existence? By very definition, what lies in the unknown cannot be foretold. It was a biologist who first discovered an electric current and the principle of an electric battery. It was a physician who first formulated the broad principle of the conservation of energy—one of the major laws of physics. The only distinctions that can be made as to relative values are in terms of contributions to understanding of our world, generality of findings, techniques available, current rates of progress, available skilled manpower, and occasionally neglected or overemphasized special areas, when so identified by the scientists themselves. This is science's own answer to the matter of priority.

But there is, of course, another and completely different question, namely: In what ways can science best serve the Nation and all mankind? Here a wholly different set of criteria apply. This question involves an appraisal of the Nation's needs and a matching of progress in the fields of science to national and human needs. For the service of science to the Nation, or to mankind, is almost exclusively a practical matter and therefore concerns the *applications* that can be made from scientific discoveries and scientific principles. This is the primary business of applied research, and after applied research has pointed the way, engineering development takes over to prepare for production or other economic application. This whole sequence properly goes under the name of *technology*. We note that applied research has to start from the basic facts of science, and engineering; therefore, the more advanced our basic research, the more advanced can be our technology.

The needs of any nation can be described in terms of fundamental human needs and wants. These are represented by such broad essentials as food, health, defense, transportation, housing,

communication, and, above all in the modern age, available power and water. The countries of the world differ little in their fundamental needs; there are great differences in the degree to which they have been able to apply modern technology to the satisfaction of those needs. The United States and other industrial nations are of course most nearly similar in this respect. Our standard of living is commonly considered to represent the extent to which we are satisfying those needs. By the same token, the standard of living we wish to attain is regarded as a measure of priority of future needs. It is one of the responsibilities of the Federal Government to see that these broad needs are met, to the extent that this has to be centrally done. Therefore, Federal departments and agencies have been set up whose primary purposes are to do what is necessary to meet this responsibility.

Government departments, such as Defense, Commerce, Interior, Labor, and Health, Education and Welfare, therefore, have responsibilities for science and technology in their respective areas. These agencies have had to develop and support appropriate technology as an aid in accomplishing their missions; but by and large they are active in science only as necessary to provide the background for that technology. Thus the Department of Defense is concerned with military weapons and devices of warfare and supports science underlying the corresponding fields of technology. Most Government departments and agencies have had considerable experience in these matters and have specialized in knowledge of the relation of science and technology to their overall missions. It would be neither logical nor feasible, therefore, to establish a Department of Science and Technology with overall supervision of these activities. Such a department could at best be only an administrative department superposed on existing ones, with confusion and frustration resulting in the operation of each separate department.

Federal activities in science proper do, however, have a common element, namely, basic research. This is true because its findings may be useful in many and unexpected directions. It is logical and reasonable that a Federal agency, such as the National Science Foundation, which keeps itself informed of the basic research activities of the Federal agencies, should exercise an appropriate degree of coordination among them and be in the

position to take the lead with respect to common programs of the Federal Government in the various sciences.

Now, the present policy of the Federal Government with respect to technology among its own agencies is simply that each agency has responsibility for what it does in technology that is directly related to its mission.

It is also the policy of the Federal Government to permit and encourage each to conduct and support basic research in fields of science related to its mission and, of course, to conduct and support applied research aimed at solving its techonological problems. Both policies are set forth in Executive Order 10521 issued by the President in 1954.

In addition to the research conducted in its own laboratories, the Federal Government supports basic research in institutions throughout the country. In order to achieve its objectives, the Federal Government must utilize the highest available research competence in science in the country wherever this can be found. Consequently, Federal departments and agencies should and do have authority to support basic science in colleges and universities, at research institutes, and at research laboratories as appropriate. This is accomplished through a selection of applications for support of basic research that are received by the Federal research offices, and also, where appropriate, by enlistment of research scientists to work on pressing agency problems.

In addition to purely practical considerations, however, the Federal Government recognizes that progress in pure science is fundamental not only to the strength and welfare of the Nation, but to its intellectual growth as well. Congress demonstrated this conviction when it established the National Science Foundation in 1950 to support basic research comprehensively throughout the country so that science would go forward actively on all fronts.

Policy on the part of the National Science Foundation is simply to support high-quality research by competent scientists in all fields, taking into account support by other agencies. The Foundation has also in view the distribution of support among fields of science and among various types of institutions. It like-

wise considers such factors as geographical distribution and due consideration of promising young research investigators.

In practice, this policy on the part of the National Science Foundation and indeed all Federal agencies consists of the encouragement of proposals from any competent scientist or group of scientists in the country. With the advice of expert consultants, the agency then makes a selection from among these proposals on the basis of the scientific merit of the research, the competence and experience of the research personnel, the endorsement of their institution, and relative importance of the field of research in question. The proposals selected then receive support in the form of a grant or contract to the institution on behalf of the persons wishing to do the research. Generally speaking, the grant or contract provides funds for equipment, materials, and personal services required for the job.

Coordination is achieved through a system whereby all agencies keep one another informed regarding their interests, the proposals they have received, and action taken on the latter.

This procedure enables the Federal Government to follow the lead of the scientists in the country in determining what research should be supported. The result is a truly national policy for the encouragement of science. Most important of all, it is consisent with the best tradition in research as outlined earlier, and permits, to a maximum degree, the freedom and independent action in the choice and conduct of research that are so necessary to the progress of science.

It should be noted that Federal policy with respect to the support of science has, in general, drawn the line at providing unrestricted research funds for institutions or departments of such institutions. This policy has been deliberate, and subject to constant review and appraisal. It rests upon two major considerations: In the first place, it is endorsed by the great majority of the country's scientists as being in the best interest of progress in science. In the second place, to provide unrestricted funds for research to educational institutions or their science departments would be a strong precedent for direct Federal aid to higher education. Although the policy of support by scientific project has been criticized by some university administrators and

scientists, majority opinion still holds it to be satisfactory. The question should, however, remain open. It is important to make certain, before any change is made, that direct support by the Federal Government to educational institutions in some manner other than by projects would be a wiser move, since a new policy, once inaugurated, would be hard to reverse.

In general this outlines present overall policy in Federal support of research in the basic sciences. There are some exceptions, chief of which is the longstanding Federal program in support of agriculture, which provides matching support to institutions. A more recent exception is in limited aid to institutions for medical research and there are some other important special cases where, as a rule, applied research and development predominate rather than basic research.

As the importance and significance of scientific research increases, the fundamental question arises: In what direction and to what degree should the Federal Government extend its support for science? To what extent should it increase its direct research activity in its own laboratories? Should it set up one or more federally operated general research laboratories in science? A still more fundamental question is the extent to which the Federal Government should provide support for education and training in science. At present this is limited to national fellowships of various kinds, summer institutes for science teachers, and a few graduate school projects for year-long training of high school science teachers, plus some programs for training in special critical fields. Our traditional policy has been to avoid Federal aid to education (an important exception being the Morrell Act, which provides aid to the land-grant colleges), and to leave the support of education to the States, the local communities, and to private sources. Now that our future, and indeed that of all nations, clearly depends critically upon the strength of our science and technology, can we still maintain this "hands-off" principle on the part of the Federal Government?

Our schools and colleges are badly in need of modern science laboratories and laboratory, demonstration, and research equipment. Most important of all, we need more trained scientists

and engineers in many special fields, and especially very many more competent, fully trained teachers of science, notably in our secondary schools. Undoubtedly, by a determined campaign, we can accomplish these ends in our traditional way, but how soon? The process is usually a lengthy one, and there is no time to be lost. Therefore, the pressing question is how quickly can our people act to accomplish these things? It is the clear duty of the Federal Government to point out what needs to be done and to take prompt steps to encourage and actively to assist—to the extent necessary—all who now have these responsibilities. Hopefully, plans may be evolved whereby the Federal Government provides temporary emergency aid only. In any event, the overriding urgency of prompt, effective, and permanent measures is fully apparent.

In all these matters it is of utmost importance that any steps taken in support of science should have the understanding and the backing of the people of the country. Our citizens must be able to understand and appraise the urgency of the national situation and to take and to urge effective action. Under our system it is not possible for the Federal Government to take adequate steps to strengthen our science education and our research unless these measures have the wholehearted support of our citizens.

ALAN T. WATERMAN,
Director, National Science Foundation.

THE SEVENTH ANNUAL REPORT—A SUMMARY

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

Studies and Reports Relating to National Science Policies

Survey of the United States Research and Development Effort.—The Foundation's Office of Special Studies herein provides answers to such questions as what fields of science are being explored and to what extent, who performs the work, who pays costs, the nature of the costs, and the proportion of research that is basic or applied. The Foundation's work in this area was set forth in several monographs issued during the year, and notably in a new series of bulletins entitled *Reviews of Data on Research and Development.* (p. 5.)

Federal Financial Support of Research Facilities and Equipment.—Today's tools for scientific research are complex and expensive. This section of the report examines the role which the Federal Government should play in providing the research facilities required for modern scientific investigations, particularly basic research. (p. 12.)

Status of High-Energy Nuclear Research in the United States.—A panel of outstanding specialists in nuclear research reports the results of a survey, jointly sponsored by the Atomic Energy Commission, the Department of Defense, and the Foundation. (p. 14.)

A Plan to Assure an Adequate Supply of Mineral Resources.—A Foundation-appointed Advisory Committee on Minerals Research proposes a research program in geology, geochemistry, and geophysics designed to assure an adequate stockpile of minerals. (p. 19.)

Proposal to Establish a Geophysical Institute in Hawaii.—In response to a Congressional Resolution, the Foundation makes recommendations concerning the desirability of using Federal funds for constructing and equipping a geophysical institute in Hawaii. (p. 22.)

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Research Results of Government-Supported Synthetic Rubber Program (1942–55) Made Available to the Public.—Through the Office of Technical Services, Department of Commerce, the Foundation releases to the public Federal research and development reports relating to synthetic rubber. (p. 23.)

United States Participation in the Brussels Universal and International Exhibition of 1958.—At the request of the Department of State, the Foundation is coordinating the United States program for the International Science Section at the Brussels Exhibition, 1958. (p. 24.)

A Photographic Sampling of Foundation-Supported Activities

Pictures heighten the interest of the narrative. These were chosen to supplement the text, and show graphically the types of activities supported by the Foundation in carrying out its function of promoting basic research and training and education in the sciences. (p. 25.)

Program Activities of the National Science Foundation

Support of Basic Research in the Sciences.—Through the Division of Biological and Medical Sciences and the Division of Mathematical, Physical, and Engineering Sciences, the Foundation during fiscal year 1957 supported basic research in an amount of $21.5 million, representing nearly 1,000 grants to 250 institutions in all 48 States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and a small number of foreign countries. (p. 34.)

Conferences in Support of Science.—During fiscal year 1957, the Foundation provided partial support for a total of 25 conferences and symposia on specific aspects of science. Such meetings are excellent opportunities for the interchange of information and ideas among investigators, both American and foreign, who are leaders in the never-ending search for new scientific knowledge. (p. 57.)

Training and Education in the Sciences.—The Foundation, through its Division of Scientific Personnel and Education, supported 96 summer institutes and 16 academic-year institutes for high school and college science teachers. For the same period, fiscal year 1957, the Foundation awarded 1,109 fellowships in the sciences—845 predoctoral fellowships, 109 regular postdoctoral fellowships, 55 senior postdoctoral fellowships, and 100 science faculty fellowships. Several other education-in-the-sciences programs are also discussed in this section of the report. (p. 67.)

Exchange of Scientific Information.—The Foundation subscribes to the tenet that no research is completed until its results have been published—and, most importantly, made readily accessible to all scientists. Herein is described the work of the Foundation's Office of Scientific Information, whose primary objective is to insure in every possible way the continuing availability of scientific information to the scientist. (p. 79.)

The International Geophysical Year.—As fiscal year 1957 closed, the International Geophysical Year began officially—July 1, 1957. Responsible for funding and Government coordination of the United States program, the Foundation reports on progress in this worldwide scientific venture in which more than 60 nations are cooperating. (p. 89.)

NATIONAL SCIENCE FOUNDATION

Studies and Reports

Relating to

National Science Policies

INTRODUCTION

In fulfilling its statutory responsibility "to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences," the National Science Foundation has undertaken or completed a number of special studies and projects during the past year—either on its own initiative, or at the request of the Congress, the Executive Office of the President, and other Government agencies.

The development of national policy for promotion of basic research and education in the sciences is, of course, a large and very important matter. The importance lies essentially in the interpretation of what one means by national policy for scientific research and also how and to what extent the Federal Government, and the National Science Foundation particularly, should take the lead. It will certainly be unanimously agreed that science and technology in this country occupy a very important place in the future of our welfare and security. Certain aspects of policy with respect to the health and strength of our scientific and technological effort are indeed matters for which the Federal Government must assume a larger share of responsibility. Certainly studies of the national effort in research and education in the sciences require analysis and so, too, do the needs and requirements of the various components of these activities. However, the nature of progress in science itself has always been and should continue to be a matter of primary decision by scientists themselves. For example, who could decide better the promise and significance of research in genetics than the geneticists themselves? In any recommendations, therefore, concerning a research effort of the country, any agency, public or private, should defer to the judgment of the active and capable research scientists in that field. In fact, it is part of the very democratic tradition of science that the direction which research progress is to take is the responsibility of research workers in the particular field of science.

On the other hand, it is feasible and highly desirable to determine what the role of the Federal Government should be in the support of scientific activities, both throughout the country and in its own laboratories. In addition, factual accounts of the status of research and

development throughout the country, the needs of colleges and universities and industry with respect to science and scientific personnel are pertinent. These studies may from time to time furnish the basis for recommendations when deemed desirable in the opinion of such an organization as the National Science Foundation, with the advice of leaders in science.

This section describes undertakings made during the year by the Foundation which are directed toward the development of Federal policy in support of science. For example, what should be Federal policy in relation to support of facilities and equipment and to administration of Federal financial support of research at colleges and universities? Special questions also arise, such as: What are the national needs for expensive accelerators to perform research in high-energy physics? Is there need for a minerals research institute to conduct research underlying the minerals industry? Should a Hawaiian Geophysical Institute be established?

A solid base of factual information is a prerequisite for the formulation of recommendations. In this connection, the Foundation is continuing its surveys of the United States research and development effort by various sectors of the economy—the Federal Government, industry, colleges and universities, private foundations, commercial laboratories, nonprofit research institutions, professional societies, etc. These surveys present a basis for analysis, conclusions, and recommendations.

The growing interest of the Foundation in international scientific activities is illustrated by the example cited which describes how the Foundation is administering United States participation in the International Science Section of the Brussels Universal and International Exhibition—1958.

SURVEY OF THE UNITED STATES RESEARCH AND DEVELOPMENT EFFORT

Scientific activity has become an economic factor to be reckoned with in terms of dollars and manpower. The Foundation has undertaken studies to answer such questions as what fields of science are being explored and to what extent, who performs the work, who pays the costs, what is the nature of the costs, and what proportion of the research is basic or applied. These and related matters have been the concern of the Foundation for the past several years. To close the gap in our knowledge, which has been widening over the past decade, a group of surveys was launched.

Beginning in 1952 with a study of the Government's financing of research and development, the Foundation extended its measurement techniques in 1953–54 to cover the entire economy, with the Federal Government taking its place as one of the four sectors. Three other sectors completed the picture: industry-oriented organizations; colleges and universities; and other institutions, including philanthropic foundations, health agencies, academies of science, and certain professional societies. Through these studies the Foundation has provided a new kind of measurement of national economic strength for the year surveyed, 1953–54, in terms of scientific manpower and dollars expended for research and development.

By the end of fiscal year 1957, most of the initial series of studies were completed. A bulletin entitled *Reviews of Data on Research and Development,* launched during the past fiscal year, has served the purpose of expediting information to the public on this series of surveys. The first issue presented the overall results on expenditures for research and development by the various sectors of the economy. Another issue combined the findings on basic research. Other issues were devoted to the data on expenditures and faculty personnel in the colleges and universities sector. Detailed reports published during the year on the studies of the other sectors are listed in Appendix H.

Expenditures for Research and Development

The total amount spent for research and development in the natural sciences—physical and life—for the year 1953–54, the starting point of the study, was $5.4 billion, which represents 1.5 percent of the gross national product of $363.2 billion for that period. Figure 1 details the amounts provided by the four sectors of the economy and the extent of their performance of research and development.

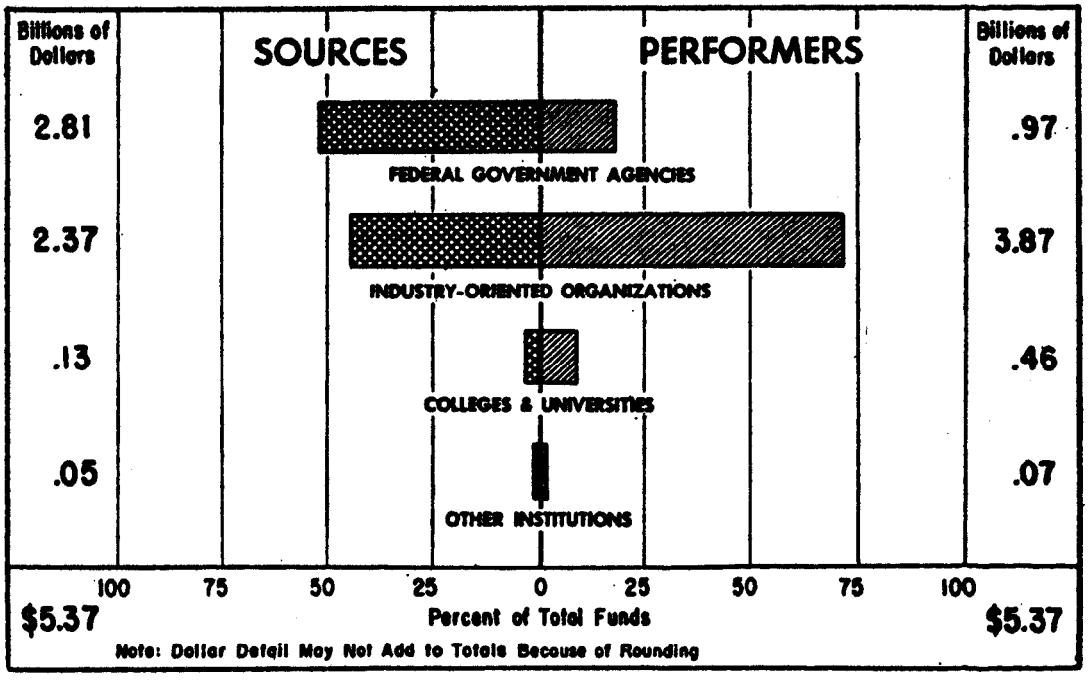


Figure 1.—*Funds for research and development by sources and performers for various sectors of the economy in the United States, 1953–54.*

The Federal Government was primarily a source of funds while industry combined the two functions, spending slightly more in performance than it contributed from its own funds. Industry performed about two-thirds of all the research and development in the natural and engineering sciences in the United States.

The colleges and universities sector, spending a total of $460 million in performance, was analyzed in terms of money spent for research at the universities proper, the agricultural experiment stations, and the Federal research centers operated by educational institutions under contract with the Government. (The table below presents sources of funds in the colleges and universities sector.)

Research and Development Performed by the Colleges and Universities Sector, by Sources of Funds, 1953–54

Source of funds	*Volume of research and development performed by colleges and universities*	
	Millions of dollars	*Percent of total*
Federal Government agencies	[1] $280	61
Industry-oriented organizations	20	4
Colleges and universities	130	28
Other institutions	30	7
Total	460	100

[1] Includes funds for the conduct of research and development at research centers administered by colleges and universities under contract with Federal agencies.

The survey of colleges and universities was of particular value because of the Foundation's concern with regard to the Federal Government's responsibility for indirect costs of federally supported research conducted at colleges and universities.

Expenditures for Basic Research

Perhaps of primary interest from the Foundation's point of view has been the measurement of basic research support in the various sectors of the economy. The Foundation has published the results of this survey with a full realization of the difficulties inherent in asking a wide variety of respondents from all fields of science to identify their research as basic or applied in accordance with definitions furnished on the questionnaires.

Figure 2, following the same pattern as figure 1, presents for the year 1953 the corresponding amounts by each sector for basic research in terms of amounts spent in performance versus the amounts derived from the sectors for the financial support of the work. The total amount for basic research, $435 million, was 8 percent of the $5.4 billion for research and development.

Colleges and universities, traditionally the seat of basic research, emerge as the performer of just under half the total basic research effort, two-thirds of which was supported by outside sources. The major supporters of basic research in terms of sources of funds were the Federal Government and industry-oriented organizations, the latter playing a major role both as a source and as a performer.

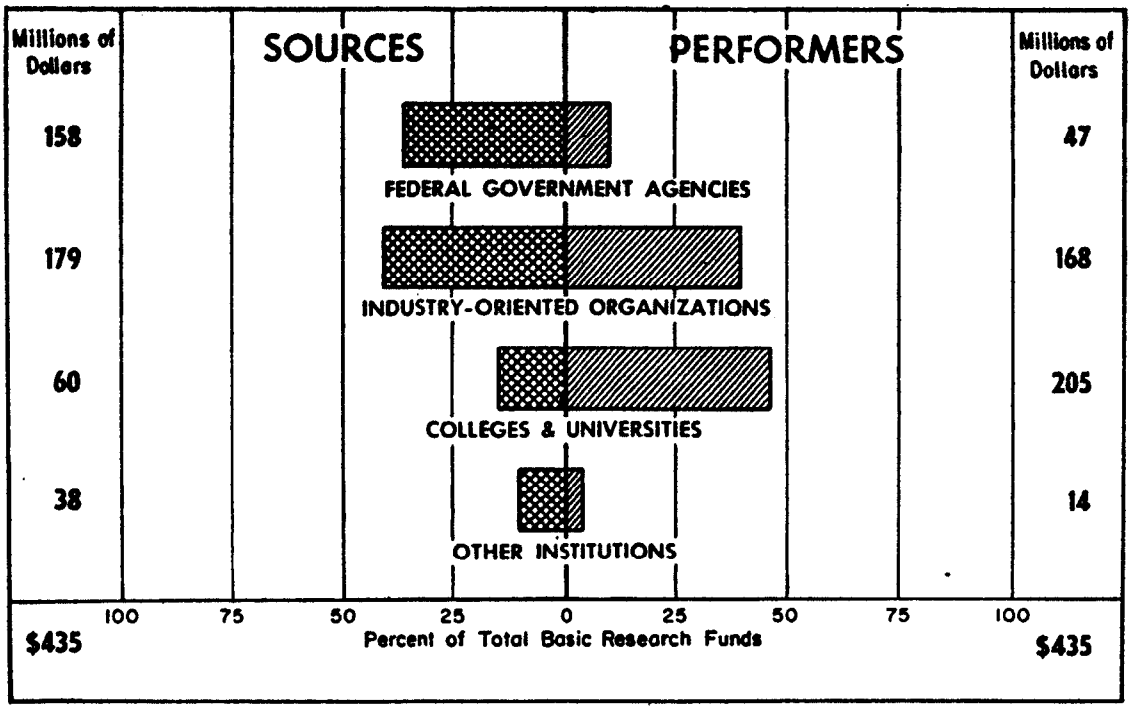


Figure 2.—*Funds for basic research by sources and performers for various sectors of the economy in the United States, 1953–54.*

Of this total basic research performance, 70 percent was devoted to the physical sciences, the remainder going to the life sciences. Industry performed half and the colleges and universities one-third of all the physical science research. Industry devoted its efforts largely to the fields of chemistry and engineering. In the life sciences, colleges and universities performed over two-thirds of the total; the next largest performer, the Federal Government, accounted for one-seventh of the total.

Scientific Manpower

Related to the dollar volume of research and development is the scientific manpower employed in each sector—information vital to our national defense and our economic strength. For the first time, more complete statistics concerning the total number of scientists and engineers employed in 1953–54 were collected from the four sectors on the basis of those engaged in research and development, by field, and those engaged in other activities. The returns showed that, in the organizations surveyed, one-third (approximately 235,000) of the scientists and engineers were engaged in natural science research activities. Of the number in research, approximately three-fourths were employed by industry.

Completion of these studies of human and material resources mobilized for the advancement of science has provided a new basis for ap-

praising the Nation's research effort. Facts gathered and analyzed will be useful for dealing with questions of policy such as support of particular areas of science, and proper balance to be maintained between basic and applied research.

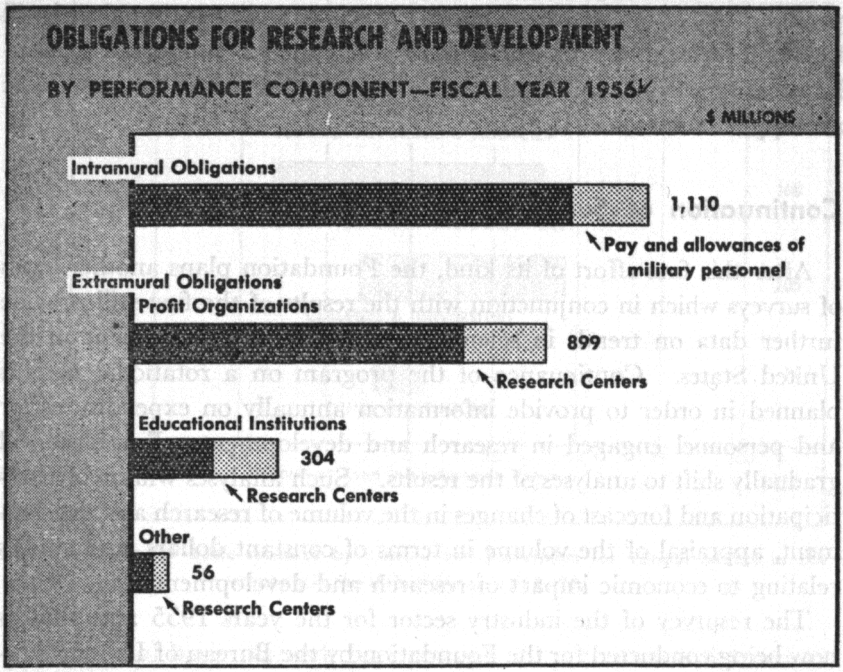
Continuation of Survey Program

After this first effort of its kind, the Foundation plans another series of surveys which in conjunction with the results of the first will provide further data on trends in scientific research and development in the United States. Continuance of the program on a rotational basis is planned in order to provide information annually on expenditures for and personnel engaged in research and development. Emphasis will gradually shift to analyses of the results. Such analyses will involve anticipation and forecast of changes in the volume of research and development, appraisal of the volume in terms of constant dollars, and studies relating to economic impact of research and development.

The resurvey of the industry sector for the years 1955 and 1956 is now being conducted for the Foundation by the Bureau of Labor Statistics. Preliminary results are expected to be available soon, thus providing trend data on industry. Wider in scope than the previous study, this survey is seeking to obtain more data on basic research. In an effort to establish the compilation of the industrial data on an annual basis for future years, the Foundation has sought the cooperation of the Bureau of the Census. This agency has agreed to collect research and development statistics in connection with their annual surveys of other cost data pertaining to manufacturing and certain nonmanufacturing industries.

Other Studies Completed or Underway

Federal Funds for Science V.—The Federal Research and Development Budget, Fiscal Years 1955, 1956, and 1957, the annual issue in this continuing series, presented a fuller accounting of the Federal research and development effort than had been done previously. In addition to analysis of the Federal research and development budget according to administering agencies, scientific fields, and character of research, the report presented data on the distribution of funds obligated for the performance of research and development in the Government laboratories, profit organizations and nonprofit agencies including educational institutions. (See fig. 3.)



[1] Estimated.

Figure 3.—*Obligations of the Federal Government for research and development by performance components, fiscal year 1956.*

NOTE.—Intramural obligations include those for work performed within the Federal Government's own research laboratories and facilities; extramural obligations cover work performed by all non-Federal organizations.

Science in the Federal Government, by A. Hunter Dupree. Publication of this book during the spring of 1957 by the Belknap Press of Harvard University Press, marks completion of a study pursued under a Foundation grant. The grant was made to the American Academy of Arts and Sciences, with Dr. Dupree conducting the study under the general guidance of the Foundation and an advisory committee. The book is a history of the growth of Federal scientific activities from colonial times to World War II.

Advisory and Coordinating Mechanisms for Federal Research and Development, 1956–57.—This publication, released during the summer of 1957, describes mechanisms used by Federal departments and agencies in planning, coordinating, and executing their scientific research and development programs.

Scientific Manpower in the Federal Government, 1954.—This study issued in the early fall of 1957 shows that over 142,000 persons, or almost

7 percent of the 2 million Federal civilian employees in 1954, were engaged in scientific activities (the conduct of research and development and other closely related activities). Almost 77,000 officers and enlisted personnel were also so engaged—2 percent of all military personnel.

Of the 142,000 civilian personnel engaged in scientific activities, over 37,000 were scientists and engineers; the rest were supporting personnel. In the military there were 9,000 scientists and engineers, plus about 68,000 supporting personnel.

The 37,000 civilian scientists and engineers engaged in scientific activities made up little more than one-third of the more than 102,000 civilian scientists and engineers employed by the Federal Government. The other two-thirds were engaged in such activities as architectural design, treatment of patients in Federal medical facilities, and zoo management. Over 70 percent of the 25,000 physical and mathematical scientists were employed in scientific activities, compared with about 25 percent of the 77,000 in the engineering, life, and social sciences.

Women scientists and engineers totaled 4,000, about 4 percent of all Federal civilian scientists and engineers.

Graduate Student Enrollment and Support in American Universities and Colleges, 1954.—One of the most striking findings of this study, published in the fall of 1957, was the enormous extent of graduate enrollment in the field of education. An estimated 88,500 students (41 percent of the total surveyed) were enrolled in education in April 1954. By comparison, only 58,000 graduate students were estimated to be in natural sciences, including engineering; another 68,000 were enrolled in psychology, social sciences, humanities, and certain professional fields.

In education, the average graduate department enrolled over 100 students, most of them in their first year of study, taking courses part time toward a master's degree. In the natural sciences, by contrast, the average graduate department enrolled less than 20 students and most students were in their second or later year of study, taking a full-time program in many cases for a doctor's degree.

Half of all resident students of the natural sciences, including engineering, held assistantships or fellowships in April 1954; the median stipend awarded was $1,395. In all remaining fields combined, only 14 percent of the students had received stipends; and their median award was $1,035.

Science and Engineering in American Industry, 1953–54.—The final report of the study, undertaken by the Bureau of Labor Statistics for the Foundation, was published in October 1956. It covers dollar-volume measurement of industrial research and development and detailed employment data.

FEDERAL FINANCIAL SUPPORT OF RESEARCH FACILITIES AND EQUIPMENT

Over the past few years, the National Science Foundation has studied the growing need, throughout the United States, for new and improved physical facilities for scientific research, particularly basic research, and the many problems and difficulties associated therewith. Therefore, when the Bureau of the Budget in 1956 indicated its interest in a report on the current status and future needs for research facilities against which annual requests for Federal support funds could be evaluated, the Foundation agreed to undertake such a general assessment, which would be helpful both to individual agencies and to the Executive Office of the President. It would also furnish useful information to research scientists and university administrators throughout the country.

Accordingly the study was made, and its principal findings and recommendations can be summarized as follows:

1. Technological advancement and the acquisition of new fundamental scientific knowledge require the employment of increasingly complex and expensive research tools.

2. Since the end of World War II the Federal Government has been financially supporting scientific research and development facilities and major equipment to an increasing extent. Current and immediately projected expenditures for this purpose range, depending upon precise definitions used between $350 and $450 million annually; expenditures alone for "extramural" facilities, Government supported but not Government operated, are likely to reach an annual rate of $200 million by 1962.

3. It has been a healthy and effective part of American tradition that individuals, groups, and institutions have done their utmost to meet their needs from their own local resources—private, industrial, State, etc. When local resources have proven insufficient, supplementary aid has often been obtained from a wide variety of sources. This sense of local responsibility should be preserved. The spread of interest and the assurance of freedom of procedure which result from a multiplicity in both the sources and forms of support are objectives which should be constantly pursued. Nevertheless, and in view of the nature of present-

day scientific developments, there have been and undoubtedly will continue to be major demands for physical facilities for science in the United States which cannot reasonably be met without Federal contributions. The evaluation of the individual cases must of course include an assessment of the urgency of the need, the national significance of the development, the availability of adequate personnel, and the degree and character of local backing. Because it does not seem feasible to set up, in advance, definite conditions on such aid which are at once sufficiently flexible and usefully meaningful to cover all cases, it seems best to evaluate these cases one at a time as they arise. Cases which are considered worthy of support will probably require a substantial total of Federal funds.

4. Important qualifications and conditions which should precede the rendering of financial assistance under this general policy include: (a) financial participation where appropriate by recipient institutions or other entities concerned; (b) availability of competent scientific manpower to operate the facility; and (c) recognition that while ideally desirable to confine Federal contributions to original establishment or construction costs, continued Federal support for facility operation and maintenance should be recognized as unavoidable in certain types of situations.

5. In certain specialized areas of the natural sciences, Federal support may be required for the establishment or refurbishment of graduate research laboratories. Before Federal support is extended in such situations, the following conditions should be established: (a) the need is urgent, (b) it is clearly in the national interest, and (c) necessary funds are not available and cannot feasibly be stimulated from other sources.

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STATUS OF HIGH-ENERGY NUCLEAR RESEARCH IN THE UNITED STATES

The fundamental importance of research in high-energy nuclear physics is generally acknowledged. The heavy costs of equipment and laboratories for the conduct of such research are also recognized. Despite the costs, however, the United States must continue in a strong position in this field, not only to maintain leadership in an important field of research but because no one can tell what knowledge of significance to the national economy and defense may come out of such work. We cannot afford the risk of being shut out of immediate participation in whatever benefits the work may yield. Hence we must be prepared to make the necessary investments to assure a vigorous research program in this field.

Realizing that private funds cannot possibly meet the needs in this field, the National Science Foundation, the Department of Defense, and the Atomic Energy Commission jointly surveyed the status of high-energy nuclear research, with the aid of an advisory panel of outstanding specialists in the field (Dr. L. J. Haworth, of the Brookhaven National Laboratory, chairman), appointed by the Foundation. Their report was submitted to the Foundation in September 1956, reviewed by the three agencies, and published. The substance of the report is summarized below.

Significance of High-Energy Physics Research

High-energy physics research is at this time one of the most challenging activities with respect to both its technology and its central importance in basic science. Its pursuit is necessary to an understanding of elementary particles which is, in turn, necessary to any real understanding of atomic nuclei.

The core structure of matter is the atom's nucleus. In a way not fully understood, these nuclei are believed to be bound together by the same kind of forces which control the lifespan of unstable elementary particles. Scientists believe that a vigorous and sustained study of these

particles will reveal the secret of nuclear forces. Included in the list of particles are the antimatter particles which when combined with ordinary matter particles become totally annihilated, meanwhile releasing tremendous amounts of energy, e. g., the proton and the antiproton.

Physicists are searching for a universal law which will explain why some of these elementary pieces of matter, such as pi-mesons, change to other particles after very short existence in their present form; others, such as positrons, have longer life times; and still others, such as electrons, remain indefinitely unchanged. There is no doubt in physicists' minds that when a law of elementary particles is found, it will constitute one of the great scientific discoveries of the century.

The importance of the field is perhaps best shown by the number of able scientists now working in it, both in this country and abroad. This represents a judgment that the field is both important and fruitful for basic science. The correctness of this judgment has been demonstrated by results from high-energy accelerators now in operation. A need for increasing available facilities is demonstrated by the great demand for operating time at the two existing multi-Bev (Billion electron volt) accelerators. Even though multi-Bev physics is barely 3 years old, there is already a several-years backlog of important experiments awaiting time on the accelerators. It is clear that this situation will become worse, even taking into account new and improved machines now under construction.

In addition to the direct scientific results, programs in this field yield many indirect technical benefits. Indeed, several developments have led directly to new instruments and equipment of importance to industry and Government in completely different scientific and technological fields.

Present Position of the U. S. A.

During recent years international interest in high-energy physics has broadened considerably. The number of high-energy installations abroad has increased significantly, notably in the U. S. S. R. where the world's largest accelerator is now in operation. Although at present the United States is leading in the number and diversity of its facilities and in the productivity of its research programs, the rate of Soviet progress has been such that this situation may not persist. Unless increased support is provided for high-energy physics, the peak in high-energy machines is likely to remain in Soviet installations because of the apparently

unlimited government support and the high numbers of qualified technical people produced by the Soviet educational system.

Because of the great scientific interest and prestige that attaches to this field of research, it is important for the United States to remain among the leaders. This leadership can be best preserved by maintaining a strong, well-balanced program rather than by permitting the work to be influenced if not controlled by specific developments abroad.

Cost of the National Program in High-Energy Physics

High-energy physics research is exceptionally expensive; indeed, it is almost uniquely so in all the domain of pure science. The basic reason lies in the nature of the fundamental particles. To produce and study most of these requires them to have very high speeds that can be achieved at present only by large and costly equipment. To high initial investments must be added operating and improvement costs, which can be expected to duplicate the initial expenditures every 2 to 4 years. Both the initial construction costs and those resulting from operations and from capital improvements are too great for educational institutions and other private research organizations to provide primarily from their own funds. In consequence, intensive work in the field is made possible only by major Government support.

The Bevatron, located at the University of California at Berkeley, is the largest accelerator constructed in this country. Another, still larger, is under construction at the Brookhaven National Laboratory—a 25–30 Bev proton accelerator. The Berkeley instrument consists of a complex arrangement of electric and magnetic fields which whip protons through 50-foot circles until speeds close to the velocity of light are reached. Some idea of the bulk of the Bevatron can be obtained from the size of its electromagnet—14 feet high with an outside diameter of 135 feet. Power is provided by 2 generators which supply 100,000 kilowatts of power. The accelerated protons have an energy of 6 billion electron volts.

The Berkeley accelerator cost from $10 to $13 million to build and about $4 million to run. Recent discoveries resulting from the use of this machine have been among other things, the antiproton and a new nuclear fusion process using mesonic atoms.

The increased complexity and costs of major high-energy facilities demand that an increasing amount of time and effort be devoted to preliminary studies and design in order to assure economical and efficient

results. The magnitude of the effort required to initiate such new technological advances is so large as to require comprehensive long-range programs, supported by long-term budgets leading from initial concepts, through a series of reevaluations, to a practicable design and construction, and finally the research project.

The development, design, and construction, as well as the effective use of the more advanced machines, require large staffs of highly qualified, full-time scientific and technical specialists in numbers well above the normal staffs of most institutions. Such requirements inevitably limit the number of institutions where advanced programs can be located, and accordingly, the number of well-considered, realistic, and meritorious grant requests for research in the field.

If individual proposals by qualified groups be considered carefully in the light of criteria discussed later, and no overall limit is set, it is estimated that by 1962, construction of 2 to 5 machines in the 3- to 12-Bev range should be underway and commitments made for studies and construction projects to attain much higher ranges of energy. This would increase the annual rate of expenditure from the current $40 million per year to an estimated $70 to $100 million [1] per year by 1962 (in terms of 1956 dollars). It includes an allowance for new construction, anticipated capital improvements, operation, and research associated with machines authorized.

Estimates are not projected beyond 1962 because of the rapid changes in accelerator technology. It is unlikely, however, that the pressure for increased expansion of effort in the field will continue indefinitely.

Question of Diversified Support

High-energy physics, like any other branch of science, will benefit from diversified support in the sense that several agencies, with somewhat different motivations, provide funds for construction, operation, and experimentation. In turn, the individual agencies will benefit from their direct contact with the work. Each agency has an important direct and specific interest in the science and technology of this field as well as a responsibility for maintaining the overall strength of this country in basic science. The scientific staff of each agency benefits by being associated with work in this field and the experience acquired will stimulate accomplishment in the other activities of the agency.

[1] This estimate is somewhat higher than that mentioned on p. 18 in view of the probable stimulation of the field by events that occurred after the latter estimate was made.

Of even greater importance is the fact that, in time of national emergency, the scientists engaged in research become immediately available to serve the country. Their work and experience will have prepared them for the kind of service most desperately needed at such a time.

Recommendations

In view of these facts the Panel recommended that:

1. The Government continue active support of high-energy physics, including the design, construction, and operation of and experimentation with high-energy accelerators.

2. The Department of Defense, the Atomic Energy Commission, and the National Science Foundation, which have important responsibilities for the promotion or utilization of science and technology, each engage directly in the support of high-energy physics; in particular, that the Department of Defense and the National Science Foundation extend their support in this field to maintain important positions.

3. Adequate support be given to existing research programs in this field.

4. Planning for the support of high-energy accelerators anticipate an annual rate of expenditure in this field of $60 to $90 million per year by 1962; this rate, large as it is in comparison with national nuclear research budgets of a few years ago, nevertheless is believed necessary to maintain a program adequate to our national needs.

5. The need for accelerators of a variety of characteristics be recognized. The most important parameters are energy, intensity, and kind of particle. In situations where a choice is to be made, it is usually better to extend the range of these important parameters than to increase the number of functionally similar accelerators.

6. Adequate support be given to research and development pointed toward new types of accelerators. It is especially recommended that efforts be made to continue to extend the energy limit.

7. No fixed general policy be made with regard to the location of new accelerators at individual universities, national laboratories, or other research establishments; but that each proposal be reviewed on its merits with due regard to the research that will be done, the stimulation to science, and the opportunities for training.

A PLAN TO ASSURE AN ADEQUATE SUPPLY OF MINERAL RESOURCES

The President's Materials Policy Commission (the Paley Commission), in its report published in 1952, examined the adequacy of materials to meet the needs of the free world in the years ahead. One of its recommendations was that the National Science Foundation should determine how an intensive program of basic scientific research and technical development can best be applied to assure an adequate supply of mineral resources. Accordingly, the Foundation appointed an Advisory Committee on Minerals Research, under the chairmanship of Dr. James A. Boyd, vice president of Kennecott Copper Corporation.

Background

Our economy and way of life depend in large measure on the production of energy and its application to the processing of raw materials. Basic to the maintenance of this economy is the assurance of adequate reserves of mineral resources to which we may turn as the deposits currently being mined are depleted and exhausted and as the ever-growing demand exceeds the capacity of existing operations. The quantity of most metals and mineral fuels used in the United States since the First World War exceeds the total used throughout the entire world in all of history preceding 1914.

Today we are faced with the unhappy prospect that the United States, the industrial leader of the world, is no longer self-sufficient in many of the basic mineral commodities. The demands of World War II and the postwar prosperity have used up some of our deposits and have made others woefully inadequate. We are therefore faced with the immediate and practical problem of how to maintain our minerals industries.

Foreign deposits and better technology in the exploitation of low-grade domestic deposits can only provide a temporary and partial solution. Foreign operations have their limitations even under relatively stable political conditions, let alone in times of emergency. In any event, the

discovery and exploitation of foreign deposits provide only a temporary postponement of the need for finding new deposits. Likewise, improvements in our techniques for extracting mineral commodities from lower and lower grade deposits also help, but only temporarily because here too we are making use of known reserves, not adding vitally needed new ones.

The ultimate answer is the discovery of new and hitherto unsuspected sources of mineral wealth. Until recently this could safely be left to the prospector, but his range is becoming increasingly restricted by expanding population. He has practically worked himself out of a job, except in the relatively new uranium industry, by discovering virtually all of the deposits that can be found by visual and simple instrumental methods. Therefore, in the vital task of finding new deposits of both metallic and nonmetallic minerals, we must depend on modern science, for it is only by gaining a better understanding of these basic processes that we can hope to guide our search for the hidden and unsuspected deposits that we need.

More than 90 percent of our metallic wealth has come from a mere 1,000 square miles of territory. At the rate we are extracting minerals, we must make every conceivable effort to locate another thousand square miles of mineral wealth. It is not an academic question; it is an immediate practical problem on which our national survival may depend.

Basic Conclusions of the Committee

The Foundation's Advisory Committee on Minerals Research, through its various subcommittees, reached the following three basic conclusions:

1. A large volume of new, coordinated research must be done in geology, geochemistry, and geophysics if the task of mineral exploration is to be pursued scientifically.
2. The ultimate volume, distribution, and character of the new research can be determined more intelligently if all published and unpublished data on mining districts are restudied and synthesized so as to avoid duplication of work already done and omission of basic studies that have never been attempted.
3. The program is so comprehensive that every existing agency, private and public, currently engaged in minerals research must be encouraged to continue, and a new research agency should be created to stimulate, coordinate, and assimilate fundamental studies and to disseminate the results of research activities bearing on mineral exploration and discovery.

Minerals Research Institute

The Advisory Committee recommended the establishment of a Minerals Research Institute, supported by the mining industry, which would conduct and sponsor basic research in the fields of earth science related to the formation of mineral deposits. The discovery and research that could lead to exploitation of any new mineral deposits should be the mining industry's business, because this industry will be a direct beneficiary of the research. The committee recommended, therefore, that the proposed institute should be supported and maintained largely by the mining companies.

The establishment of such an institute is being actively explored by the minerals industries.

PROPOSAL TO ESTABLISH A GEOPHYSICAL INSTITUTE IN HAWAII

By joint resolution of the 84th Congress, the National Science Foundation was authorized and directed to make a study of the feasibility and desirability of using Federal funds for constructing and equipping a geophysical institute in the Territory of Hawaii.[1] A special 10-man advisory committee under the chairmanship of Dr. E. A. Eckhardt was appointed to aid the Foundation's study. The committee's conclusions served as a basis for the Foundation's report to Congress which was submitted on May 1, 1957.

In summary, the Foundation believes that there are good scientific and related geographic and educational reasons for establishing a geophysical institute as a part of the University of Hawaii. However, the Federal Government should obligate funds only if assurance is provided that (1) the research potential of the supporting science departments of chemistry, physics, mathematics, and geology will be adequate to operate the institute at maximum efficiency; and (2) continuing local support will be of sufficient magnitude to guarantee successful operation.

The Foundation further recommended that, if established, funds for the geophysical institute should come out of a special congressional appropriation and should not be part of the Foundation's regular budget.

[1] Public Law 909, 84th Cong., ch. 685, 2d sess., H. J. Res. 643, approved August 1, 1956.

RESEARCH RESULTS OF GOVERNMENT-SUPPORTED SYNTHETIC RUBBER PROGRAM (1942–55) MADE AVAILABLE TO THE PUBLIC

On July 1, 1955, the research and development functions of the Federal Facilities Corporation concerned with synthetic rubber were transferred to the Foundation.[1] With this transfer came a large body of technical and scientific information in the form of progress reports and project completion reports from contractors—both universities and plant operators—involved in this program up to the time of disposal of the manufacturing plants (1942–55).

The Foundation determined, after a review of the situation, that it was in the national interest to make available to the public all of this information which was acquired through the expenditure of Federal funds.

Accordingly the Foundation during the past year completed the transfer of all research and development reports dealing with synthetic rubber to the Office of Technical Services of the Department of Commerce. OTS, through its usual procedures, has made it possible for any interested firm, organization, or person to purchase copies of these reports from the Library of Congress for the years 1949 to 1955. If the demand warrants it, earlier reports will be made available.

[1] NSF 6th Annual Report, pp. 28–30.

UNITED STATES PARTICIPATION IN THE BRUSSELS UNIVERSAL AND INTERNATIONAL EXHIBITION OF 1958

The National Science Foundation, at the request of the Department of State, is coordinating the United States program for the International Science Section of the Brussels Universal and International Exhibition of 1958. Sixteen nations are contributing to the science exhibition.

In essence, the Foundation is (a) funding the United States program with money transferred from the Department of State; (b) administering the program under the United States Commissioner General, Howard S. Cullman; (c) providing such assistance as the scientists may need in the preparation of exhibits; and (d) furnishing all logistical support.

The United States program is expected to consist of more than 60 exhibits. These exhibits will become an integral part of the International Science Sector which is divided into four classes—the atom, the molecule, the crystal, and the living cell. Four advisory committees of prominent American scientists (one for each class) have been appointed by the Department of State to assist the National Science Foundation in determining the scientific content of the exhibits.

The Belgians plan that the International Science Pavilion will include a 600-seat theater in which a continuous film summarizing the whole exhibit field from human biological phenomena to atomic physics will be shown. "The Unity of Science" is the central theme of the film.

Following this film there will be a popular exhibit section—planned for a wide audience—where the visitor will be able to watch actual experiments and demonstrations depicted in the film. A large area will be set aside for each of the four exhibit classes. Here scientific ideas will be demonstrated in as varied and animated a way as possible. Arrangements will be made for lecture demonstrations by prominent scientists and the showing of short scientific films illustrating certain specific theories.

A science library and a mural dealing with historical aspects of science will complete the pavilion.

Thus, the organizers of the pavilion hope to satisfy the varying tastes of a very wide audience at different levels of knowledge.

A Photographic Sampling of Foundation-Supported Activities

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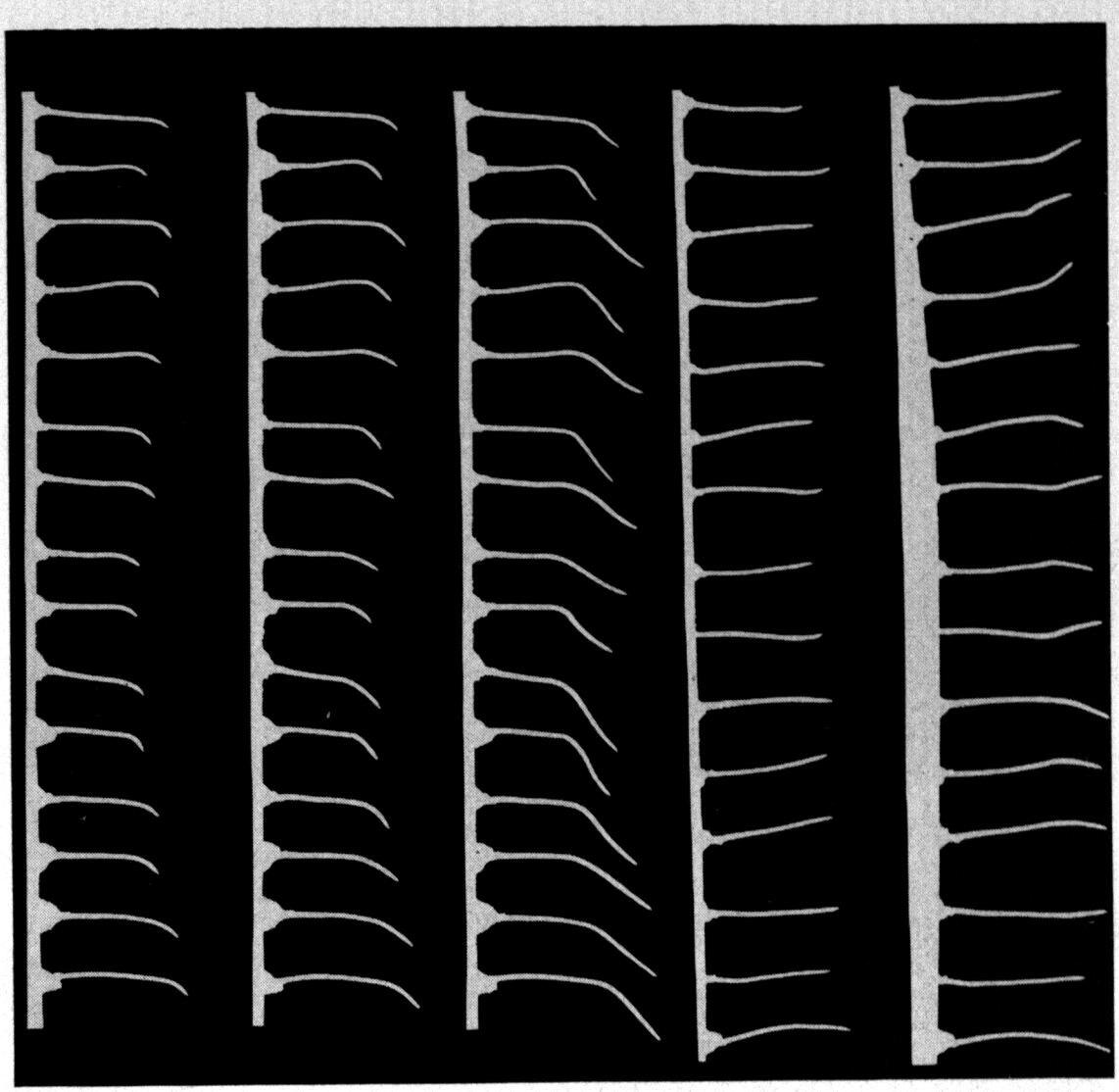
LOCATING SITE FOR OPTICAL ASTRONOMICAL OBSERVATORY

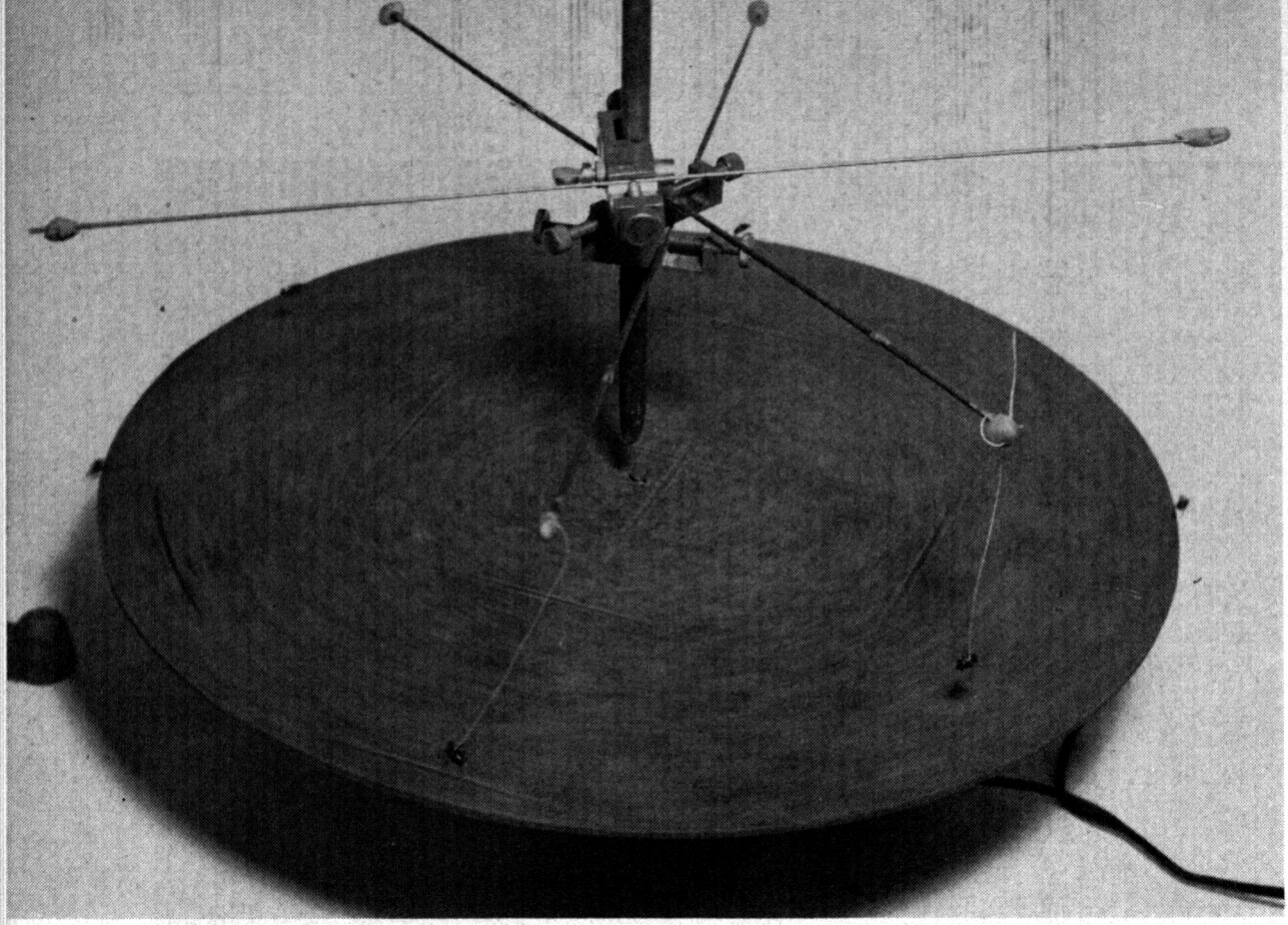
The 60-foot "seeing" tower is located on top of Kitt Peak, Ariz., and is 1 of 4 so far erected for the purpose of determining the most suitable site for the construction of an optical astronomical observatory in the Southwest. The tower is a triple-shelled steel structure equipped with a telescope that continually measures the turbulence in the atmosphere by gaging the size of the image of the star Polaris. This information, along with wind and temperature data, is transmitted to recording instruments located at the base of the tower. **(See p. 49.)**



CONTROL 2 hours | CONTROL 4 hours | CONTROL 12 hours | N-1-P 4 hours | N-1-P 12 hours

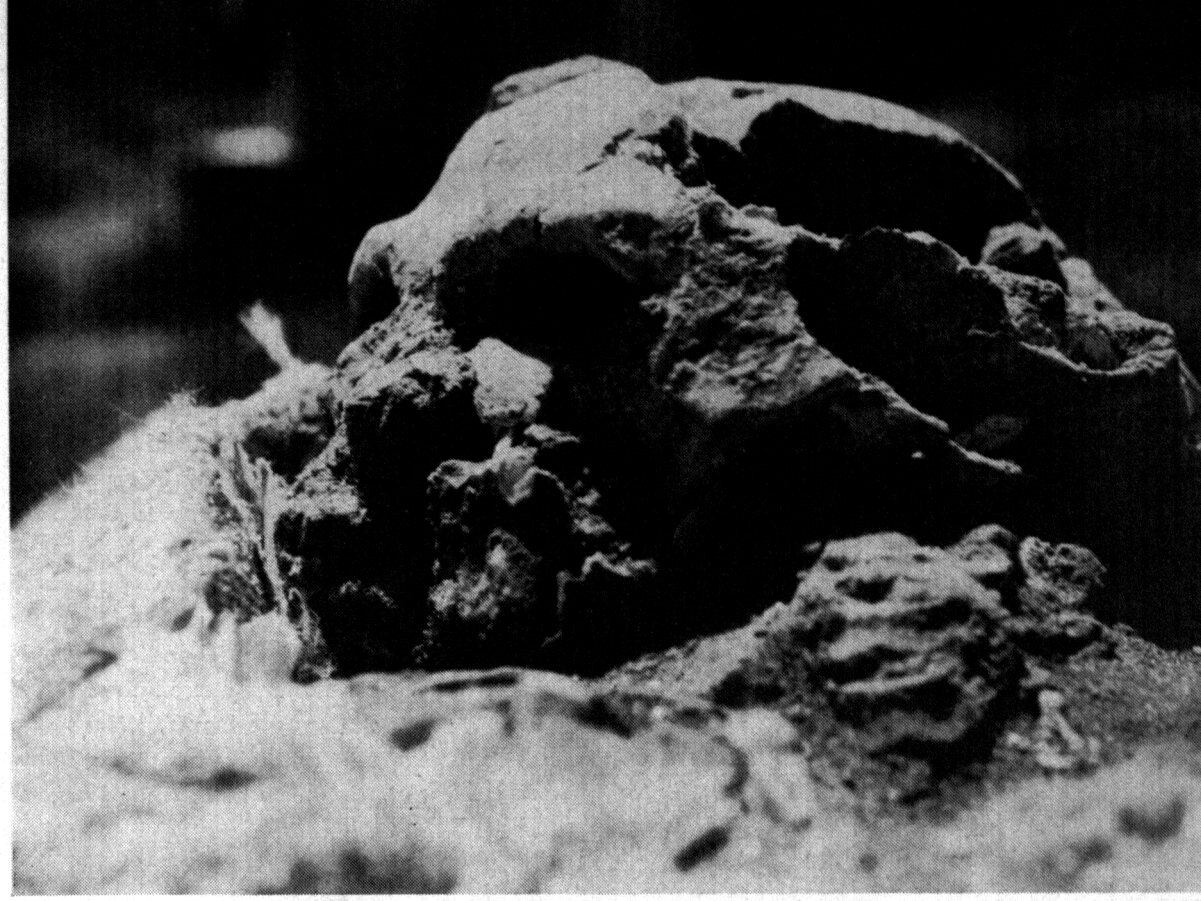
INTERFERING WITH PLANT ROOT RESPONSE TO GRAVITY

These are time-lapse shadow graphs of corn roots showing loss of geotropic sensitivity following treatment with minute concentrations of N–1 naphthylphthalamic acid. The seedlings were maintained in a horizontal position in a moist incubator for the indicated time. Downward bending was obvious in the controls after 1 hour and continued to increase until 12 hours. As is evident from the shadow graph, the treated seedling grew but did not know which way was down. (See p. 38.)



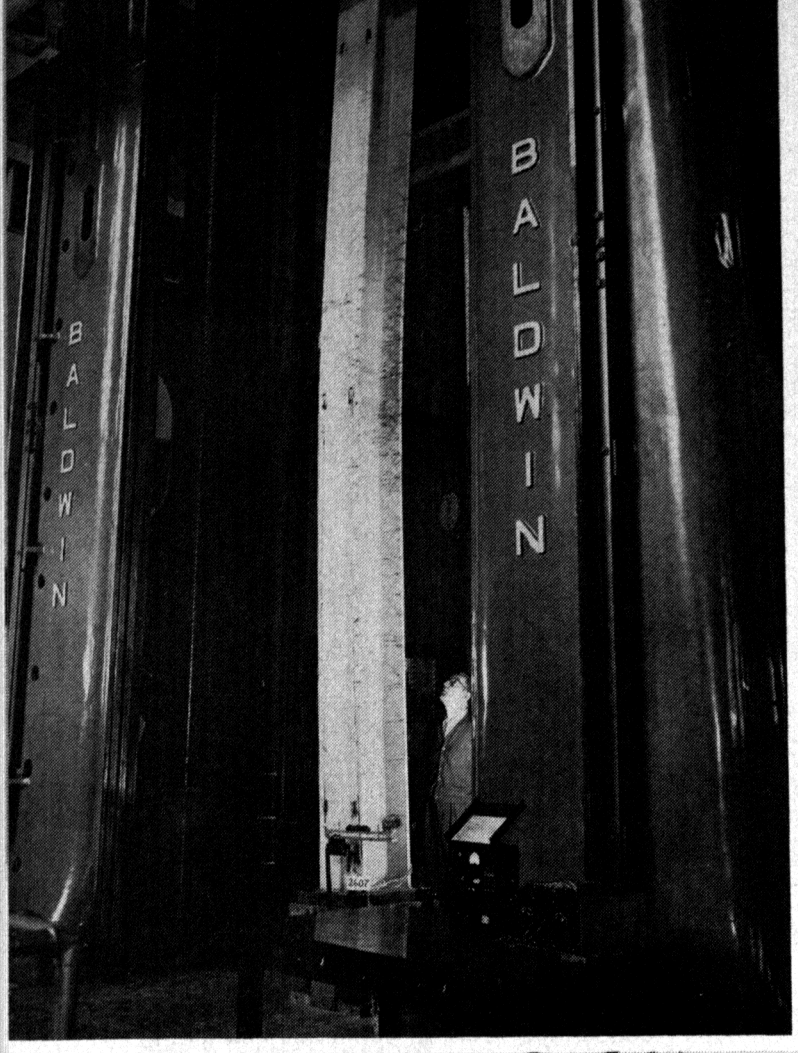
"FLYING" FLIES TO EXHAUSTION

One of the interesting techniques used to study the physiology of insect feeding, a subject of great practical importance to man's health and economy, is that of using a turntable to "fly" flies to exhaustion in order to deplete their carbohydrate reserves. They were then fed a highly stimulating but nonnutritional sugar to test their hunger reactions. **(See p. 39.)**



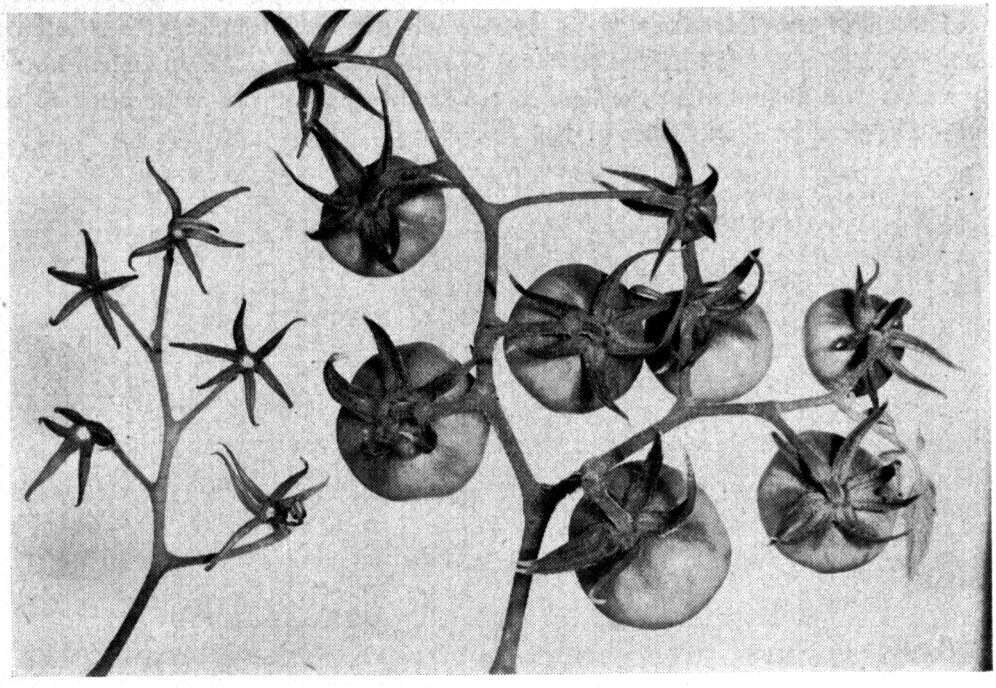
45,000-YEAR-OLD SKULL UNCOVERED DURING EXCAVATION OF SHANIDAR CAVE IN NORTHERN IRAQ

This 45,000-year-old skull belonged to an adult Neanderthal man and was uncovered during excavation of Shanidar Cave by a Smithsonian Institution-sponsored archeological expedition, partially supported by the National Science Foundation. The cranium had been struck by stones and displaced at the time of accidental death. The neck vertebrae can be seen in their original position. **(See p. 43.)**



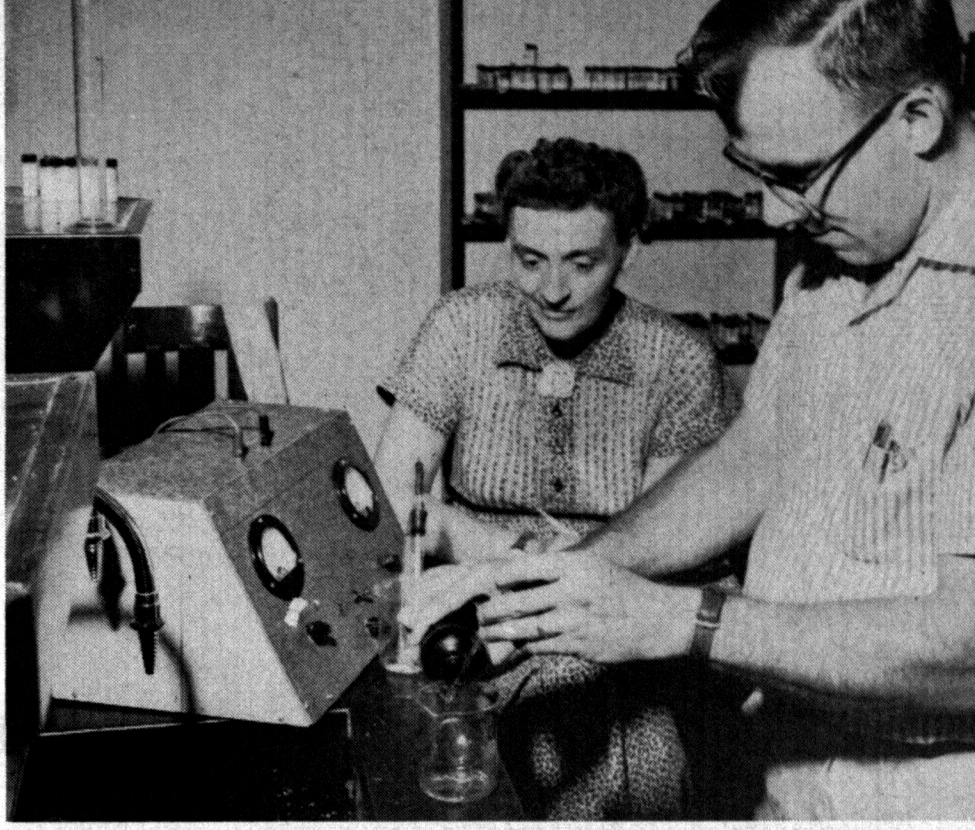
LARGEST HYDRAULIC TESTING MACHINE IN THE WORLD

Major contributions in the field of plastic and "ultimate" design of structures now revolutionizing the civil engineering profession have been made possible by means of the above-pictured hydraulic testing machine. This machine located at Lehigh University is capable of exerting pressures up to 5 million pounds per square inch. The Foundation in sponsoring research on the effect of residual cooling stresses and cold bending stresses upon the ultimate strength of rolled wide-flange columns. Note the bend in the column as it is about to buckle near its capacity load.



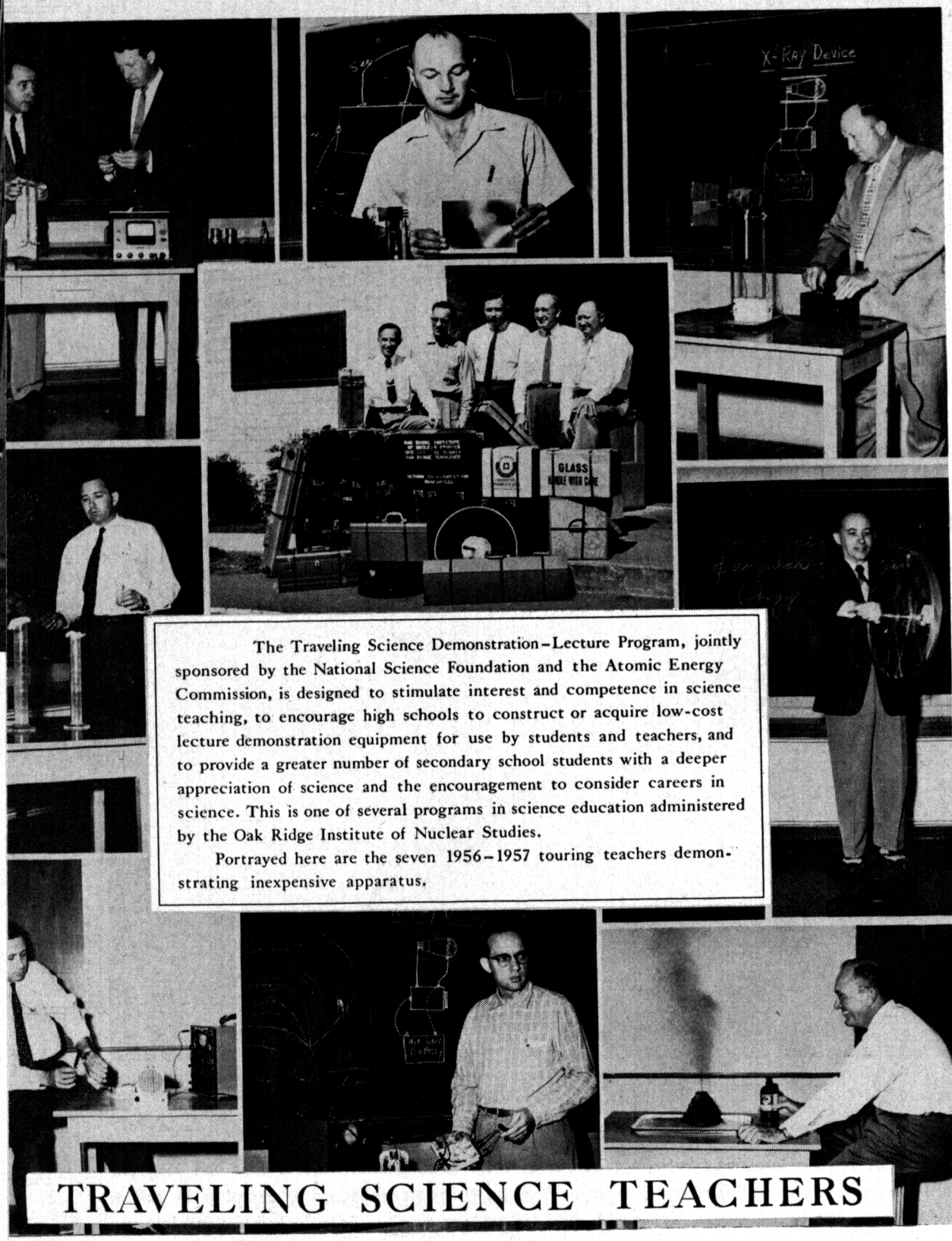
OVERCOMING SUMMER DORMANCY IN THE GROWTH OF TOMATOES

The tomato plant at the left shows the arrested fruit growth which normally occurs during the hot, bright Texas summers. The plant at the right, however, shows the effect of spraying a similar tomato plant with gibberellic acid. The condition of summer dormancy is broken, permitting normal growth. **(See p. 37.)**



RAISING THE STANDARDS OF HIGH SCHOOL SCIENCE TEACHING

Typical of the Foundation-supported program of summer institutes for improving the competence of high school and college teachers of science and mathematics was the institute held at Iowa State College last summer. The participants obtained knowledge in scientific subjects through lectures, symposia, and laboratory work. Also included was instruction in the building of training aids for use in the teachers' own classrooms. The upper photograph shows teachers using a pH meter constructed during chemistry laboratory sessions. The lower photograph shows other teachers with some of the models constructed during biology laboratory sessions. **(See p. 71.)**



The Traveling Science Demonstration–Lecture Program, jointly sponsored by the National Science Foundation and the Atomic Energy Commission, is designed to stimulate interest and competence in science teaching, to encourage high schools to construct or acquire low-cost lecture demonstration equipment for use by students and teachers, and to provide a greater number of secondary school students with a deeper appreciation of science and the encouragement to consider careers in science. This is one of several programs in science education administered by the Oak Ridge Institute of Nuclear Studies.

Portrayed here are the seven 1956–1957 touring teachers demonstrating inexpensive apparatus.

TRAVELING SCIENCE TEACHERS

Program Activities of the National Science Foundation

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SUPPORT OF BASIC RESEARCH IN THE SCIENCES

Research 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. Fiscal year 1957 research projects described here in brief are to be considered illustrative of the type of research being supported. The projects described are not necessarily the most significant, nor is the number selected meant to be indicative of the relative importance of the particular program.

DIVISION OF BIOLOGICAL AND MEDICAL SCIENCES

Current Research Support

In *Regulatory Biology,* almost all phases of research in physiology and physiological biochemistry are represented. One of the larger components is intermediary metabolism, both animal and microbiological. Other large segments include endocrinology, immunology, cellular physiology, plant physiology, and neurophysiology. During fiscal year 1957, this program gave continued support to research on the problem of plant growth and differentiation, including studies of growth-promoting substances such as the auxins, kinetins, and gibberellins. Other promising projects supported are an investigation of biochemical and physical mechanisms involved in the transfer of substances across the cell membranes; the elucidation of the metabolism of a recently discovered biologically active compound, mevalonic acid, which is required for growth of microorganisms; and a number of studies of the function of the integrating systems (endocrines, nervous tissue, etc.) of the animal organism.

The major effort of the *Molecular Biology* program is on the structure, synthesis, and reactivity of proteins and other macromolecules, and with the more molecular aspects of intermediary metabolism and biosynthesis. In protein chemistry, for example, grants were made for research on the

theory of diffusion of macromolecules, on the one extreme, and on the synthesis of polypeptides, on the other. In the area of intermediary metabolism and biosynthesis, grants were made for research dealing with amino acid metabolism, with enzymatic synthesis of a desoxyribonucleic acid, and with virus formation. A significant number of grants were made in bioenergetics; on the morphology of ultrafine structure; and on photobiology.

The support of research in *Psychobiology* reflects a continued emphasis on neuropsychological work. For example, support was given for studies of problems of brain biochemistry and behavior, and for neurophysiological work. Other outstanding grants include one for research on the biophysics of vision; on chemoreception; on neuromechanisms of behavior; and on conditioned learning. Of importance to the general field of experimental psychology was the continued support of work relating mathematical research techniques to psychological research. The support of research and training activities in the smaller departments of psychology was also extended in fiscal year 1957, with grants to the University of Nevada and to the University of New Mexico.

In *Environmental Biology,* approximately half of the active grants were for studies in the dynamics and structure of animal populations, quantitative community ecology, and qualitative phytosociology and vegetation development. A quarter of the program supports research in physiological ecology with projects oriented toward physiological reactions of plants and animals to environmental factors. The remainder of the program includes projects related to paleoecology; ecological aspects of behavior; terrestrial, marine, and fresh-water productivity; limnology and biological oceanography; parasitology; life history studies; radiation ecology; and microclimatology. Grants initiated in fiscal year 1957 included research on physiological ecology of marine animals; late-Pleistocene limnology; integration of a forest community; ecological physiology of avian behavior; ecological microcosms; productivity of alpine plant communities; environment-related changes in composition of phytoplankters; ecological relationship of amphibian species; and relation of external environment to the incidence of parasitism in fish.

Research in *Systematic Biology* continued to support the program's objectives of clarifying evolutionary history of living and extinct organisms, and of furthering our knowledge of their spatial interrelationships. Projects supported included both traditional studies involving identification, nomenclature, and classification; and those utilizing genetic and physiological techniques to complement the more classical methods which depend primarily upon morphological criteria. The program has at-

tempted to encourage the exploration of problems involving experimental research techniques without neglecting those studies upon which taxonomy traditionally depends. Of great importance to systematic biologists are indices of various sorts; the preparation of these is a time-consuming and often thankless task for which institutions need modest assistance of a sort the Foundation's advisers are strongly disposed to recommend. Foundation grants are now resulting in active work on three such indices: an "Index of Lichens from 1935 to 1955," a "New Index Muscorum," and a compilation of generic names of fossil plants for the "Index Nominum Genericorum."

Grants in the *Genetic Biology* program are distributed about equally among studies of higher animals, higher plants, and micro-organisms. Among studies on higher animals, about half of the grants activated in fiscal year 1957 support research on *Drosophila,* the fruitfly. Among *Drosophila* investigations, one is of particular interest in that it is aimed at determining the genetic basis for behavior patterns. This study not only illustrates how useful *Drosophila* can be because of the extensive knowledge of its genetic composition but also how separate disciplines like genetics and psychology can be effectively brought together in a single coherent project. Again in the area of animal genetics, a study of special interest is that of the effects of radiation on polygenic inheritance in chickens. This is a pioneer effort on the use of X-rays to induce "good" mutations which result in improvement of quantitative traits, such as egg production. In the area of plant genetics, support was provided for a continuing attack on the nature of the gene in maize. Illustrative of evolutionary studies in plant genetics is one on the cytogenetics of wheat. Here continued support will permit completion of the identification of the source, in the evolutionary sense, of the chromosomes found in modern polyploid bread wheat. In microbial genetics, support has been provided for an investigation of the fine details of the gene-enzyme relationship. Slowly but surely studies of this sort in biochemical genetics are clarifying our understanding of exactly how the gene works, one of the most fundamental problems in genetics.

An idea of the nature of the *Developmental Biology* program may be obtained from several projects supported during the past fiscal year. For example, one of the most interesting developmental studies being undertaken is that concerned with transferring nuclei from cells which are partially or fully differentiated back to an enucleated egg. By this approach, it is hoped to establish whether or not the nuclei from the older cells become irreversibly altered during the course of their differentiation. Another important research project is that dealing with

studies of the mechanisms of lens formation. Lenses originate from the epidermis which covers the embryonic eye primordia and this process requires an intimate contact between the optic cup and the lens-forming tissue. The nature of the interactions between these two tissues and how they result in the production of the lens is under close scrutiny. Still another project is a tissue-culture analysis of the developmental effects of a number of mutations in the mouse. These mutations produce failures in various organ systems. Developmental studies have indicated that the organs involved require interactions between two or more embryonic tissue components during the very early stages. The investigators are attempting to establish at which point the genetic factors produce their effects and where the anomalies have their initiation. Such an approach, with tissue culture, has great promise, and indirectly, applicability to congenital anomalies in human beings.

Within the *Anthropological and Related Sciences* area, fiscal year 1957 grants have included several in anthropology and archeology, and one or two each in demography, psycholinguistics, and social psychology.

Significant Research Developments

SUMMER DORMANCY IN TOMATOES.—Tomatoes (particularly the Marglobe variety) are adversely affected by the high light intensities and temperatures of Texas summers. The condition of "summer dormancy" in tomatoes in essence amounts to a very marked reduction in the growth of both vegetative and reproductive structures. Foundation-sponsored research has shown that cool temperatures, auxins, or red light are capable of reversing this dormancy. However, none of these methods serves as a practical method of control in the field.

Far red light, on the other hand, enhances dormancy. Such light is normally received in the summertime; irradiating winter greenhouse tomatoes with far red light produces typical midsummer symptoms. Spraying the plants with gibberellic acid neutralizes the effect of far red light, thus breaking the dormancy and allowing normal growth. The use of this technique may provide real economic gains for farmers in Texas and similar areas. (See p. 30.)

NIGHTTIME OCEANIC LUMINESCENCE.—The displays of light which are sometimes observed in the ocean at night are so brilliant that a fish or man swimming beneath the surface is clearly outlined by the light; a ship or even a submarine may be detected from the air by virtue of the light. This luminescence is caused by small unicellular organisms, primarily dinoflagellates. An investigator has found that the dinoflagel-

late *Gonyaulax polyedra* emits light rhythmically—as much as 60 times brighter at night than in the daytime. This rhythmic behavior is much like that of a clock, so that it might be called a biological clock. For example, it can be reset so that maximum luminescence occurs during the day, merely by arranging appropriately scheduled lights. But this clocklike activity, although geared to the environment in this fashion is not dependent upon environmental changes for the rhythm to persist. Under absolutely constant conditions, the luminescent response will continue to go up and down, marking off daily cycles of approximately 24 hours. This is actually an ability to tell time; a well-known characteristic of higher organisms. The way in which this rhythmicity occurs within the cell is now under investigation. It has already been determined, for example, that the protein enzyme which catalyzes the chemical luminescent reaction increases and decreases daily in phase with changes in light emission. The widespread occurrence of diurnal ryhthmic behavior suggests that the oscillating chemical system within the cell may be a very fundamental process. Understanding of the mechanism for this rhythmic process may lead to an understanding of such basic biological functions as the wake-sleep relationship and the periodic electric discharge of nerve cells.

CHEMICAL NATURE OF PLANT GROWTH RESPONSE TO GRAVITY.—The mechanism by which plants "feel" gravity, and how once they have felt gravity they orientate their growth is not well understood. One recently developed explanation of why the roots grow down and the shoots grow up is chemical in nature.

The sensory mechanism for gravity detection in plants may be analogous to the "solion" device developed for missile guidance. Disturbance of the plant's orientation in space initiates electron flow between metabolically maintained areas of fixed potential. In some as yet unexplained way this electron flow initiates the chain of reactions leading to differential growth.

A chemical agent, N-1-naphthylphthalamic acid has been discovered which inhibits growth only slightly in minute concentrations. Seedlings treated with this agent, however, fail to respond to gravity. The roots grow in random directions. (See p. 27.) The substance seems to prevent differential growth. The existence of such substances should provide for studies of correlative growth and may have results as important as those arising from earlier correlative growth experiments with "weed-killing" plant growth regulators.

DISCOVERY OF NEW METABOLIC PATHWAY IN MAMMALS THROUGH STUDY OF CONGENITAL PENTOSURIA.—The metabolic basis

for the genetic abnormality known as congenital pentosuria, an apparently harmless defect characterized by the excretion of the rare pentose sugar, *L*-xylulose, has been investigated. It was possible to use this defect as a clue to an undiscovered area of metabolism, since current knowledge did not provide an explanation as to how *L*-xylulose might be formed. Furthermore, a study of pentosuria might serve as a model for investigating other harmful metabolic defects, which probably include muscular dystrophy and arthritis.

The information about the widespread ability of mammals to produce *L*-xylulose, together with evidence that it can be utilized by animals, suggested that this sugar is a normal metabolite. Enzymes were found in the liver whose action provided an understanding of the normal metabolic pathway of the sugar and an insight into the enzymatic deficiencies in pentosuric individuals.

As a result of this work it now seems clear that another metabolic pathway in mammals had been uncovered. There appear to be sidepaths, thus making it difficult to define clearly the nature of the defect in congenital pentosuria. This question is still under study, but it is considered secondary to the problem of elaborating a new metabolic pathway in the mammalian organism.

PHYSIOLOGY OF INSECT FEEDING.—Insects consume such large quantities of our agricultural crops, stored food, houses, and clothing that the dollar losses run into astronomical figures. They also feed upon man much to his discomfort. Yet, despite the importance of insects' feeding habits in relation to human health and economy, very little is known about the physiology of insect feeding. What is the basis of hunger in insects? What stimulates them to feed on certain materials and at certain times? Can their feeding behavior be altered to the benefit of mankind? These are some of the questions which are being answered through Foundation-supported research.

The investigation has shown that many insects are stimulated to feed on particular materials by specific chemicals characteristic of those materials. These chemicals are termed "token stimuli" and do not necessarily bear any relation to nutritional adequacy. Nevertheless, they are extremely important in determining an insect's choice of food and the quantity which it will consume. Experimental techniques have been devised whereby flies, living in a container in which there are drinking tubes with different kinds of liquid foods, can freely choose one of these and automatically activate a recording device which records the choice of food, the quantity of food taken, and the duration of feeding. These experiments have shown, among other things, that there is no relation

between the nutritive value of carbohydrate foods and their effectiveness in driving the fly to feed on them.

Experiments designed to determine the relationship between hunger and sensory stimulation (taste threshold) suggest that hunger is merely the absence of inhibitory stimuli. The evidence is that when the fly is fully fed, these inhibitory stimuli prevent messages from the taste sense organisms from rousing the desire for food. (See p. 28.)

STRUCTURE OF PROTEINS.—Proteins are the basic life substance. They include the enzymes and, in conjunction with polynucleotides, they form the genes and viruses, as well as the templates from which proteins reproduce themselves. A fundamental biological problem is that of the structure of these molecules. An award-winning investigation of the hydrodynamic and thermodynamic properties of proteins has led to significant knowledge as to the influence of the overall or gross configuration of protein molecules on their reactivity. The hydrodynamic experiments provided an assessment of the influence of the configuration on reactivity; the thermodynamic experiments, more detailed information about interactions between specific groups within the molecule.

The most recent work on carboxyl and tyrosyl ionizations in bovine serum albumin has provided evidence of the detailed changes taking place within the albumin molecule and provides a basis for the so-called configuration adaptability of this protein.

CHANGES IN ELECTRICAL ACTIVITY ACCOMPANYING THE LEARNING PROCESS.—Just how the brain works during the process of learning has been until quite recently almost a complete mystery. A technique has been devised for inserting microelectrodes into the gray matter of the brain of animal subjects to measure changes in electrical activity which accompany the learning process. It has been determined that the first step in conditioning (a form of learning) appears to be not the formation of new connnections between the nerve cells in the brain (a previously widely held view) but rather the elimination of widespread generalized responses to a particular stimulus. In time a more limited and specific response emerges to the stimulus as the result of stimulus repetition. Thus, the development of control over irrelevant responses seems to be a more important factor in learning than the formation of new nerve cell connections. The investigators are now determining the changed electrical reactivity in various areas of the brain occurring during the conditioning process from the time the stimulus is first presented until the animal is fully conditioned to react to the stimulus in a specific way. Through the development and use of such precise techniques as those employed in this research, we will be able to obtain an understanding of how the brain operates in the learning process.

ENVIRONMENTAL FACTORS INVOLVED IN DETERMINING THE SUCCESS OF INSECT REPRODUCTION.—In basic studies of the effects of temperature on milkweed bug development, results have been obtained which could prove of unusual importance to personnel concerned with predicting and combating outbreaks of destructive insects. An investigator found that the occurrence of a finite temperature threshold for hatching of the milkweed bug eggs is correlated with depletion of food reserves in the egg. Temperatures below 20° C. retarded development much more than they retarded expenditure of energy. Thus, at lower temperatures there may not be enough egg food reserves to complete development of the insect. Further studies revealed, however, that in addition to the "hatching threshold," there is what may be termed a "viability threshold" which is independent of hatching and which requires temperatures of 20° C. or higher. The exact nature of this vitality factor is as yet unknown, but it appears to be biochemical and to be correlated with the abrupt change in developmental rate curves at around 20° C. in this species. These data suggest that hatching does not necessarily imply that an insect will grow. Lacking "vitality" it will die even under favorable environmental conditions. Accordingly, the current practice of using hatching percentages to predict the size of future insect populations (e. g., pest outbreak prediction) may not be a sound scientific technique.

MECHANISM UNDERLYING THE INDUCTION OF MUTATIONS.—Concern over the genetic effects of radiation has brought to the foreground our incomplete understanding of the mechanism underlying the induction of mutations. In bacteria, the delayed appearance of radiation-induced mutations for several cell generations has offered an unusual opportunity to study the factors which operate in mutagenesis. Outstanding work has been performed in analyzing the basis of the delayed appearance of one type of ultraviolet-induced mutant. It was found that the percentage of mutants which will appear is determined during the first hour after irradiation. Moreover, the number is directly proportional to the rate of protein synthesis going on in the bacterial cells during this first hour. Although many of the mutants cannot be detected until later generations, a given irradiated cell will produce either all mutant descendants or none. It would seem, therefore, that a "premutant" state is present after the first hour in those cells destined to give rise to mutants. The nature of the "premutant state" and the steps from it to the manifest mutation are unsolved and fascinating problems. Their solution may go to the very heart of the mechanism behind the induction of mutations.

RELATIONSHIP BETWEEN AGE OF FATHER AND SEX OF OFFSPRING.—The cause of the small, but significant, excess of male to female human births is not understood. For this reason, considerable effort has been expended in the past on studies of the relationships between the age of parents, birth order, and the sex ratio. It has been often reported that with increasing age of the mother the sex ratio decreases. However, it has now been established that the age of the father is significantly correlated with change in sex ratio, whereas that of the mother is not. The apparent relationship of age of mother and sex ratio is only a reflection of the fact that, in most cases, the mother and father are of comparable ages. The significance of these findings is that they shift the emphasis from maternal to paternal causes behind the sex ratio deviation. Previously, differential survival of young embryos, with a change toward greater equality as the mother's age increased, was considered the best possibility. Now it will be necessary to look for causes of a change in the relative production or survival of male- and female-determining sex cells produced by the father as he ages.

FACTORS INVOLVED IN EMBRYONIC LIMB DEVELOPMENT.—Investigation of tissue interactions which result in the formation of a limb and of the specificities inherent in the tissues are being accomplished with the use of chick embryos. At the stages upon which the experiments are performed, the limb buds are very simple structures. An investigator has grafted tissue from a potential thigh area to the region which would ordinarily form the digits of a wing. The thigh tissue becomes modified and does form digits (a change in fate), but these are foot digits (the tissue retains its leg specificity). At these stages, therefore, regionality may be modified, but limb-type specificity is retained. Recently this investigator has turned his attention to a study of the role which cell death may play in the formation of the limb. While one does not ordinarily think of cell death as playing a part in the formation of a structure, painstaking investigations have revealed that the basic contours of the wing and leg are shaped by a wave of cellular degeneration. Cell death is particularly important in the formation of the elbow and knee.

SEQUENTIAL DEVELOPMENT OF EMBRYONIC TISSUE.—Normal cells of an early embryo are all alike. They grow by division after synthesis of new protoplasm. As embryonic cells grow, they become different from their precursors and from each other. Some form pigment cells; others, nerve sheath cells, connective tissue cells, white blood cells, etc. A study of amphibian embryos was undertaken to determine the biochemistry of differentiation by means of tissue culture. The researcher found that fairly simple organic compounds in the immediate environment of the cell act to drive the cell-differentiation machinery in specific

ways depending on the compounds and their concentrations. He induced the formation of amphibian pigment cells from precursors which never normally form such cells by a mild increase in the concentration of the amino acid phenylalanine. He also prevented the formation of pigment cells from precursors which normally form such cells by using an analog of phenylalanine. The inhibition can be relieved by the addition of a small amount of phenylalanine which in amphibians is synthesized by striated muscle cells. This is one example of sequential development of the embryonic tissues; the chemical products of one regulate the growth of other tissues.

EXCAVATION OF SHANIDAR CAVE IN NORTHERN IRAQ.—Support of research on the archeology and human paleontology of Shanidar Cave in Northern Iraq has resulted in several important discoveries. Chief of these were the finding of two adult human skeletons of premodern type and the discovery of an early neolithic village site nearby containing rudimentary foundations of rough field stones. The discovery of the two skeletons, in conjunction with the earlier finding of a child's skeleton in 1953, places Shanidar Cave among the more important Early Man sites in the Old World. The skeletal remains were found in an unfossilized or natural state due to the good preservative qualities of the soil, and appear to be of Neanderthal type on preliminary observation. One of the skeletons is possibly about 45,000 years old, the other about 60,000 years. (See p. 29.)

Facilities for Research in the Biological and Medical Sciences

Fiscal year 1957 was the first year in which the Division of Biological and Medical Sciences participated more or less formally in the support of research through grants for facilities. It was found that there is a demonstrable need for support in this area for facilities, such as controlled environmental laboratories, maintenance and use of systematic collections, and biological field stations.

Some 24 proposals for facility support were received during fiscal year 1957, totaling $5,175,000. Of these, 11 resulted in grants to the amount of $885,000.

Support has been provided for the repair, maintenance, rehabilitation, or expansion of field-station facilities. Of particular interest is a $415,400 grant to the Marine Biological Station at Woods Hole for the rehabilitation of a research laboratory building, the Crane Wing. A small grant of $24,000 went to the famous Naples Zoological Station for general maintenance and support. Two principal objectives of the grant were partial remuneration for the wear and tear to the facilities

resulting from their use by American scientists and recognition of its importance as a truly distinguished international research facility.

Other grants went to Yale University for the construction of a facility for a recirculating sea water system, and to the Philadelphia Academy of Natural Sciences for systematic research collections.

DIVISION OF MATHEMATICAL, PHYSICAL, AND ENGINEERING SCIENCES

Current Research Support

In the *Astronomy* program, grants ranged from studies related to the establishment of a large astrographic telescope in the Southern Hemisphere to a systematic search for super novae, and included studies of the distribution of interstellar dust, the infrared spectrum of the planets and the moon, and analyses of the solar electron corona. A method of narrow-band photoelectric photometry, using interference filters, has been perfected to give stellar color excesses and absolute magnitudes of high accuracy. This will allow a much better picture of the dust distribution and space distribution of the stars in the neighborhood of our galaxy than hitherto possible. Observations have been made of young clusters of stars which appear to have caught some stars in their earliest stages of evolution while still contracting gravitationally; among these are the T-Tauri stars.

As in previous years, the *Chemistry* program provided its chief support to research in organic and physical chemistry. In addition, support was extended to low-temperature and to high-polymer chemistry. As an example of low-temperature research, experimental and theoretical investigations of paramagnetism in crystalline salts are producing data of value in explaining the main features of the magnetic behavior of many salts in terms of crystalline fields, exchange reactions between ions, and interactions between the electronic and nuclear systems.

The *Engineering Sciences* program during the past year has supported basic research in heat transfer, metallurgy, electronics, reaction kinetics, fluid mechanics, and the mechanics of solids and materials. Areas of support range from dynamic and impact studies on concrete beams to the investigation of the mechanics of information transmission in human speech to research on meteor-burst phenomena which should add to our knowledge of long-range, interference-free transmission of very high frequency radio waves.

Studies of the earth, its constituents, its physics, and its chemistry fall within the cognizance of the *Earth Sciences* program. Support is provided for such fields as geology, meteorology, oceanography, and the like, as well as the newer fields of geochemistry, geophysics, and aeronomy. Projects supported during the past year vary from the study of the deep-sea floor to the study of the earth's magnetic field several hundred miles above the solid surface; and from the study of the composition of the earth's core to the physics of precipitation.

The concept of applicable mathematics until recently has rested in the domain of analysis. It now appears that the methods of the topologist, abstract algebraist, or mathematical logician are also of great value in the solution of practical problems, e. g., as interest in high-speed computing machine grows, mathematical logic contributes first to design, then to operation. The *Mathematical Sciencies* program has therefore continued in the support of research in group theory, topology, and mathematical logic; also to emphasize grants which would encourage talented students to become productive mathematicians.

The *Physics* program as in previous years provided much assistance to investigators of atomic nuclei and the solid state. High-energy physics received considerable support, particularly studies dealing with interactions of fundamental particles. Grants were also made for studies of the relationship between the general theory of relativity and quantum mechanics.

The *Sociophysical Sciences* program has emphasized research and conferences in the mathematical social sciences and in the history and philosophy of science. Among the research grants made in this program is one concerned with prediction of the behavior of individuals in situations where they are confronted with alternatives of which they have only imperfect knowledge.

Significant Research Developments

NEW SCANNING SPECTROGRAPH.—The development and construction of a new scanning spectrograph, with support from the Foundation, is quite likely one of the most important developments in astronomy during the past year. To test possible evolutionary changes in color and brightness and other cosmological problems, accurate observations of the color and brightness of galaxies were needed. By means of the scanning spectrograph, it has become possible in certain cases to obtain detailed information about the emission of energy in the violet regions which had been missed completely in the six-color photometry previously used. These features were found to have a significant effect on the observed

color index of a galaxy with a large red-shift and eliminated the color excess originally reported which indicated a rapid evolution of galaxies. The new observation provides strong support for the opposing "steady state" theory.

CHEMICAL STRUCTURE OF AN ANTIBIOTIC DETERMINED.—The chemical structure has been determined of an antibiotic known as Magnamycin. It is one of a group of antibiotics called macrolides isolated from soil microorganisms (Streptomyces). Members of this group, all of which contain a macrocyclic lactone ring in their structure, include Erythromycin, Pikromycin, and Oleandomycin. Obtaining information about chemical structure is the first step in the process synthesizing antibiotics tailored to specific requirements.

LIVING POLYMERS.—A polymer is a compound of high molecular weight formed by the joining together of simpler molecules, the relative amount of each element remaining the same. Rubber and plastics are examples. Polymeric molecules are born in an initiation process, grown by a propagation process, and finally die in a termination process. The death is regulated by the conditions prevailing during polymerization. Polymeric molecules have been developed which do not die and live for an indefinite period of time. A living polymer does not grow indefinitely, nor does its molecular weight grow beyond certain limits. It keeps growing until the supply of the monomer, the simple molecules from which it is formed, is exhausted. The ends remain living, however, and the polymer can grow again as soon as more monomer is added. From a color reaction it is even possible to tell whether or not the polymer is still living. And as indicated by the color change, it is possible to kill the living ends by the addition of air or moisture, thus stopping the process at will. Through the use of living polymers, it becomes quite simple to build block polymers, polymers formed from more than one monomer. As soon as one is exhausted, the next is added. The monomers used determine the block polymer's characteristics. The process is terminated by adding air or moisture. This investigation makes easily possible the formation of custom-built polymers.

ORIGIN OF METEORITES.—Metallurgical examination of meteorites has led to an understanding of the origin of meteorites. It has been shown that the iron-nickel alloys composing metallic meteorites cooled slowly under high pressures, and that at the same time fragmentation took place, suddenly releasing prevailing pressures. Better understanding of the processes initiated by entry of a meteorite into the atmospheric envelope of the earth may contribute to solution of problems associated with the reentry of aircraft or missiles into the earth's atmosphere.

STABILITY AND CONTROL OF CHEMICAL REACTORS.—Successful design of a chemical reactor is dependent upon the proper choice and regulation of pressure, temperature, and concentrations. Pressure may be varied to change reaction rates. Many reactions are very sensitive to temperature. In some cases, if the temperature rises above a certain value, gas desorption takes place; this condition may offset an increase in the reaction rate. Thus the control of the reactor is very important in order to obtain a desired product. An analysis has been made of the stability and control of a chemical reactor under a variety of conditions not previously considered. This study, which made use of a Univac computer, gives criteria for use in determining under what conditions various modes of control are feasible. Critical operating points, where the reaction may get out of hand, can also be predicted and thus be avoided by proper design.

PORTABLE INSTRUMENT FOR DIRECT MEASUREMENT OF CLOUD WATER CONTENT.—During the past 10 years there has been much publicity and activity in weather modification or "rainmaking" through the use of small crystals of carbon dioxide or silver iodide as nucleating agents. However, until more is known about the mechanics of precipitation and the general field of cloud physics, the possibilities of rainmaking cannot be fully realized. Of special interest in this area has been the development of a portable instrument that can measure directly the water content in a cloud. This radically new apparatus collects water as a plane flies through a cloud, mixes the water with a conducting solution, and electrically measures the amount of dilution. The instrument has passed its preliminary tests with flying colors and should aid greatly toward understanding precipitation mechanics.

GEOCHEMISTRY OF MERCURY ORES.—As a result of investigations into the geochemistry of mercury ores, it has been demonstrated rather conclusively that the black sulfide of mercury (metacinnabar) is the stable form of the compound at temperatures in excess of 344° C. and that the red sulfide (cinnabar) is stable at lower temperatures. This is contrary to previous ideas and will provide a better explanation for the origin of many quicksilver deposits. This knowledge should aid prospecting for new deposits in known mercury districts by permitting determination of the potential of the buried ore body from the outcrops.

MODERN ONE-VOLUME HANDBOOK OF TABLES OF MATHEMATICAL FUNCTIONS.—With the development of new scientific techniques, new and better tables of mathematical functions are needed. The Foundation is supporting the development of a modern handbook of tables within the compass of one volume. An example of the results being obtained is the compression of the table for the exponential integral, pre-

viously occupying 740 pages, into the space of 6 pages. It is estimated that the new handbook will contain 1,000 pages.

NEW COSMIC-RAY TELESCOPE.—Cosmic-ray physicists have been able to study particle reactions in energy ranges many billion times as great as those possible in even the largest accelerators (6 billion electron volts). A cosmic-ray telescope has been constructed which will record particles entering the earth's atmosphere with energies as high as 10^{18} (billion billion) electron volts. The results indicate that, in the energy range 10^{15}–10^{18} electron volts, cosmic rays come from all directions in space—an observation critical for theories concerning the origin of cosmic rays. At the highest energies recorded to date, the radii of curvature of primary cosmic rays in the magnetic field of the galaxy are becoming comparable to the transverse dimensions of the galaxy. In addition, the measurements indicate that the structure of the electron-photons provided by the impact of these primary particles are in agreement with present concepts of particle interactions.

The measuring techniques used in this investigation are so promising that it is now planned to extend the energy range of the apparatus and use it to conduct a cosmic-ray probe of the size of our galaxy. This will be of particular importance in that it may show that our galaxy, like nearby galaxies, is surrounded by a "halo" of magnetic fields and ionized matter.

MORE PRECISE LINEAR MEASUREMENT.—A new line-spectrum source for meeting the ever-more-exacting standards of precision linear measurement has been discovered. The investigator developed an operable calcium beam lamp which gives a spectrum line one-half as wide as the one produced by the isotopic-mercury lamp now used in this country. The lamp uses a well-defined beam of calcium atoms to carry the luminous discharge.

BUILDUP OF HIGHER ACCELERATOR BEAM CURRENTS MADE POSSIBLE.—Investigation of methods for producing particle collision using intersecting beams and only one accelerator has resulted in a quite feasible technique. It has been found possible with a modified fixed-field, alternating-gradient technique to have beams of the same mass and charge circulating in opposite directions in a single accelerator. This will permit the buildup of higher beam currents in several types of accelerators.

MANNER IN WHICH TECHNOLOGICAL CHANGE IS GENERATED AND PROPAGATED.—A mathematical model has been developed, in an attempt to explain the manner in which technological change is generated and propagated in the United States. The investigators used the introduction of hybrid corn as the subject of the study and plotted the be-

ginning of the movement, its rate, and its destination. Their conclusion was that once an invention has occurred or a useful and feasible idea has been published, the process of innovation, of developing the new idea, and of adapting it to the particular conditions of various markets is for the most part a process which is guided by economic consideration. The rate at which an innovation is accepted is largely a function of the relative amount of profit that can be obtained from the innovation. Similarly the level at which the new technique is stabilized is primarily determined by economic variables.

Facilities for Research in the Mathematical, Physical, and Engineering Sciences

During the past fiscal year, a $4 million contract was entered into with the Associated Universities, Inc., for the construction of a radio astronomy observatory at Green Bank, W. Va. This facility will consist of 2 radio telescopes—one with a 140-foot paraboloid antenna and the other with an 85-foot antenna and auxiliary equipment. When completed, the 140-foot unit will be the largest and most advanced device of this kind in the United States. The observatory is intended to accommodate visiting radio astronomers as well as having a resident staff of moderate size. This observatory should be a significant factor in restoring the United States to a position of leadership in radio astronomy, a field opened up by the discoveries made by an American scientist, C. M. Jansky, Jr.

A grant for $500,000 was made to the Massachusetts Institute of Technology to provide partial support for the construction of a 2-million-watt nuclear reactor, estimated to cost $2.4 million. (The balance was obtained from other sources.) This reactor now under construction will be used for research in the solid state, radiation sterilization of foods, radiation-induced mutations, radiochemical investigations, radiation-induced catalysis, and reactor development. Hospitals in the Boston area will be able to use the neutron beam source in cancer therapy.

The reactor will also serve to educate engineers and scientists in the theory, design, and operation of nuclear reactors; in techniques for producing, handling, and measuring nuclear gamma radiation and radioactive material; and in the principles and application of reactor instrumentation.

A grant of $545,000 was made to the University of Michigan, for a continuation of studies leading to the establishment of an optical astronomical observatory in the Southwest. To date, four 60-foot "seeing" towers have been erected, all in Arizona, each one equipped with an

ingenious optical telescope for the continuous monitoring of Polaris. Data from each of these instruments will give an adequate measure of atmospheric turbulence at its location and so permit determination of the most satisfactory site for the observatory. (See p. 26.)

The building of these facilities should permit great progress in the field of astronomy. It will make available the latest research equipment to American scientists and will permit advanced research and post-graduate training of young astronomers.

Research-Related Activities

Support of Travel to International Scientific Meetings

On the basis of favorable congressional action, the program for the support of travel to international scientific meetings was reinstated in fiscal year 1957. The awards to individual scientists generally amounted to round-trip air tourist fare between the scientist's home institution and the location of the meeting. Travel grants were made only for carefully selected international scientific congresses and meetings; in addition, several individual grants were made in support of travel for other purposes, such as to attend committee meetings, and to visit laboratory or research sites. A total of 205 grants was made at a cost of $118,286.

Training Aspect of Research Grants

A continuing contribution of the research grants program is in the training of scientists, at both the pre- and postdoctoral levels, through research assistantships and associateships. Thus an important subsidiary result of the research grants made during fiscal year 1957 is that approximately 2,000 such people will receive advanced training in the sciences. These 2,000 are in addition to the over 1,100 fellows who will continue or resume full-time educational activity under the Foundation's 4 fellowship programs. (See Fellowships, p. 67.) Thus, a total of more than 3,100 men and women will have been provided opportunity to continue their scientific education and to gain experience under mature and seasoned investigators in the laboratories of our colleges and universities.

Miscellaneous Grants

Many of these programs are experimental in nature; most of them for comparatively small amounts. One of these programs was the

support of short-term research by medical students who do not participate in their medical school curricula for periods of an academic quarter or more to perform research under faculty mentorship.

Several other grants were made to enable qualified independent investigators, graduate students, and independent teachers from small colleges, to conduct summer research at field stations and established laboratories.

Other grants were made for summer research institutes in highly specialized fields, such as the one in mathematics which investigated mathematical logic and its interaction with algebra and topology. Another summer institute will provide training in nuclear emulsion research; yet another will provide research biologists with training in the techniques of electron microscopy.

Evaluation and Coordination of Research Programs

The Foundation's programs for support of basic research have been under way for six complete fiscal years. Consequently, there is natural interest in evaluating the return which the American taxpayer has received or can expect to receive on his "investment" in basic research. At this time, however, it is unrealistic to expect that immediate practical benefits will be visible. Results of basic research cannot be completely evaluated until years after the research has been completed, since rarely does one individual research project lead directly to significant practical application. The release of atomic energy was the culmination of decades of research by numerous individuals on the properties and structure of matter. It took years of basic research before Bell Telephone Laboratories developed the transistor. Therefore, there is a real hazard in attempting to evaluate or justify basic research programs in terms of a short-term assessment of practical "payoff." If such appraisal were to be emphasized, both Federal administrators and research scientists might tend to concentrate on work most likely to exhibit identifiable but relatively insignificant progress—with unfortunate distortion of our national basic research effort toward direction of applied research and development as a result.

However, it is possible to assure that Federal research funds are wisely spent. This can be done by (a) preselection evaluation to determine the research proposals of the greatest scientific merit, (b) postresearch evaluation through intensive followup of research results so that information is made available, and (c) minimizing duplication of research effort through coordinative processes.

Preselection Evaluation

The number of basic research proposals that the Foundation supports is a small fraction of the total number of proposals received. In order to select the most meritorious for support with the limited funds available, the Foundation typically employs a stringent evaluation process by which each proposal (which has been previously screened by the academic institution from which it emanates) is reviewed and rated by advisory panels of outstanding scientists, as well as by the professional staff of the Foundation. Only the most worthy proposals (about 75 percent of the total) are eligible for financial support.

Postresearch Evaluation

Once a research grant is made, the scientist is given maximum latitude, and the Foundation does not attempt to exercise control or direction over performance of research. Nonetheless, as research progresses, certain interim evaluation is possible. Scientists attempt to publish the results of their research in the appropriate scientific journals. By and large, space in scientific journals is at a premium, and only those papers which appear to have significance to the scientific community are accepted for publication. The quality of research performed by Foundation grantees is indicated by the fact that through June 30, 1957, nearly 2,000 articles in scientific journals, papers, monographs, etc., have resulted from Foundation-supported research.

At the end of a research project, and annually for projects that cover more than a year, grantees submit reports of their research to the Foundation. Progress made under previous grants is considered by advisory panels when the research scientist in question submits a request for further support. This also serves as an important step in the evaluation process and helps to insure that NSF funds are expended wisely.

Coordinative Processes

The Foundation has consistently aimed at elimination of undesirable duplication in Federal research support through various means. Emphasis has been given to insuring exchange of information among science administrators. One method for making information available has been the publication of periodic lists of Federal grants and contracts in several areas of science. For example, based upon information supplied by cooperating agencies, the Foundation has compiled and made available project lists in the life sciences (annually); in psychology,

psychiatry, and related areas (semiannually); and in social sciences and interdisciplinary fields (semiannually). This year it is also planned to issue such project lists for the mathematical, physical, and engineering sciences.

A quotation from the fiscal year 1955 issue of the life sciences project listing indicates the extent of coverage:

> . . . The listing contains 9,496 projects which were active during the period July 1, 1954 to June 30, 1955. The total rate of support represented by the projects approximates $82,544,000 . . . . The listed projects were supported by some eighteen agencies or their subdivisions and it is believed that this comprises essentially all Federal agencies and subdivisions which support unclassified research in the life sciences . . . . Thus, the report is complete to the extent that these agencies reported the pertinent life sciences information . . . .

These listings serve as a directory of all projects supported by Federal agencies at colleges, universities, and other institutions, and enable any agency in reviewing a proposed project to ascertain at a glance if any similar project is already receiving Federal support.

Current information on proposals received is also exchanged between various Federal agencies on a monthly basis. At the same time, informal contacts between science administrators throughout the Federal Government are strongly encouraged.

Fiscal Analysis of Research Programs

During fiscal year 1957, the Foundation made grants totaling $21,458,925 for the support of basic research in the sciences, including $5,930,000 for the construction and maintenance of research facilities. These funds made possible 997 grants in the biological, medical, mathematical, physical, and engineering sciences to 350 institutions in all 48 States, the District of Columbia, Alaska, Hawaii, Puerto Rico, Bermuda, Canada, Great Britain, Italy, Israel, Japan, and Sweden. Research grants for fiscal year 1957 averaged $15,539 to run for 2.06 years, or about $7,543 per year.

Facilities grants are discussed in detail in the sections dealing with programs of the research divisions.

The following table summarizes the research grant program by subject catgeories. A detailed list of the grants showing institution, principal grantee, title of project, and amount is given in appendix B.

National Science Foundation Research Grants by Fields of Science

Field	Fiscal years 1952–56		Fiscal year 1957		Total	
	Number	Amount	Number	Amount	Number	Amount
Biological and medical sciences:						
Anthropological	18	$184,800	17	$153,500	35	$338,300
Developmental	70	586,182	32	382,750	102	968,932
Environmental	82	746,860	65	777,200	147	1,524,060
Genetic	75	994,700	41	659,250	116	1,653,950
Molecular	181	2,748,730	84	1,784,950	265	4,533,680
Psychobiology	134	1,659,550	54	783,100	188	2,442,650
Regulatory	215	2,921,145	114	1,870,400	329	4,791,545
Systematic	177	1,399,080	89	706,575	266	2,105,655
General	40	721,510	31	503,200	71	1,224,710
	992	11,962,557	527	7,620,925	1,519	19,583,482
Mathematical, physical, and engineering sciences:						
Astronomy	75	1,261,800	33	453,900	108	1,715,700
Chemistry	254	3,106,200	147	2,653,700	401	5,759,900
Earth Sciences	102	1,318,275	54	770,150	156	2,088,425
Engineering	181	2,008,700	103	1,369,950	284	3,378,650
Mathematics	128	1,553,200	64	1,038,900	192	2,592,100
Physics	195	3,036,400	53	1,348,300	248	4,384,700
Sociophysical	8	105,100	12	154,100	20	259,200
General	1	7,000	4	119,000	5	126,000
	944	12,396,675	470	7,908,000	1,414	20,304,675
Total research grants	1,936	24,359,232	997	15,528,925	2,933	39,888,157

From figure 4 and the accompanying table, it can be seen that salaries accounted for 70.2 percent and equipment for 21.5 percent of the total funds distributed. Indirect costs were estimated at 13.5 percent of direct costs.

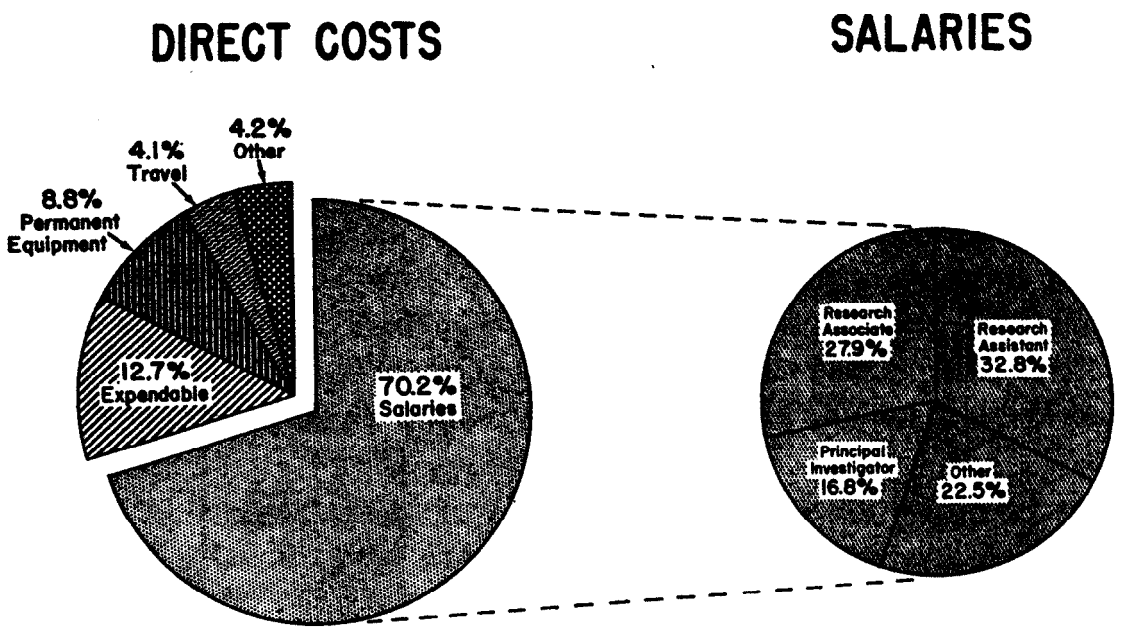

Figure 4.—*Analysis of the average National Science Foundation research grant in fiscal year 1957 by types of expenditures (estimated).*

Analysis of Salaries Paid From Average Research Grant [1] Fiscal Year 1957

	Average Grant Fiscal Year 1957	*Percent of salaries*
Principal investigator (total)	$1,612	16.8
Summer	(1,213)	(12.6)
Sabbatical	(24)	(.3)
Academic	(375)	(3.9)
Research associate [2]	2,683	27.9
Research assistant [3]	3,149	32.8
Other [4]	2,167	22.5
Total	9,611	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 when they are doing the research.

[3] Includes graduate assistants enrolled at the grantee institution and working toward a graduate degree.

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

Of interest in this discussion of Foundation support of basic research is figure 5 which compares, for the years 1953–57, the dollar value of meritorious proposals received with grants awarded. As can be seen

from figure 5, the dollar value of the meritorious proposals which cannot be supported keeps increasing from year to year. The number of proposals also keeps increasing. Characteristically, the proportion of proposals supported in terms of number is significantly higher than in terms of dollar value because most proposals are supported at a lower dollar value than originally proposed. This permits the spreading of limited funds over a larger number of meritorious proposals.

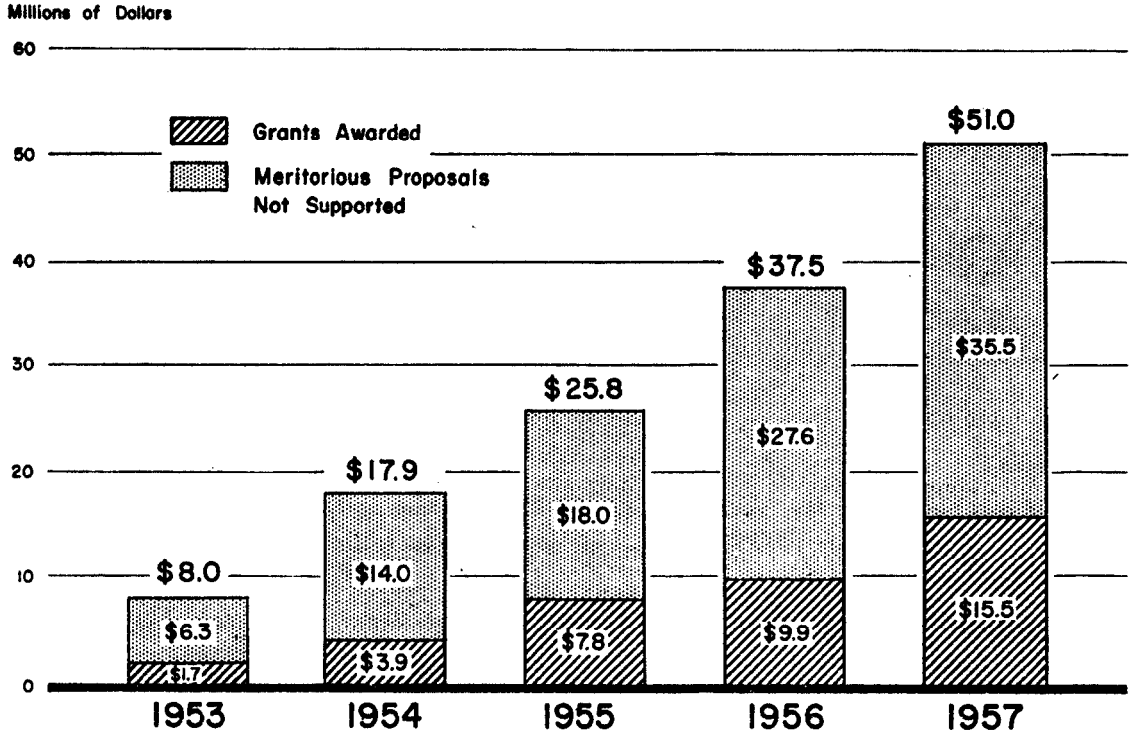

Figure 5.—*Comparison of meritorious proposals received with grants awarded, fiscal years 1953–57.*

CONFERENCES IN SUPPORT OF SCIENCE

The National Science Foundation as one of its primary functions supports conferences and symposia on specific aspects of science. These meetings provide excellent opportunities for the interchange of information and ideas among those investigators who are the advance guard in the never-ending search for new scientific knowledge. They also, in many cases, furnish the opportunity for younger investigators to meet and obtain information and advice from some of the world's foremost scientists.

The conferences are of two types—those where the subject matter is of particular interest to scientists in the same specialized field, and those where the subject matter is of interest to scientists in other fields. In many cases these meetings are attended by distinguished foreign scientists who participate in the discussions and presentation of papers along with their American colleagues.

The National Science Foundation sponsored and provided partial support for a total of 25 conferences in support of science during the year ending June 30, 1957—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 scientific topics covered by these 25 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, 1957

Subject	*Cosponsoring organizations*	*Chairman*
15th Growth Symposium...	Society for the Study of Development and Growth.	K. V. Thimann.
Binary Stars.....	Dominion Astrophysical Laboratory.	R. M. Petrie.
6th International Congress of Hematology.	International Society of Hematology, American Cancer Society.	William Dameshek.
Asphyxia Neonatorum Brain Damage and Impairment of Learning in Experimental Animals.	University of Puerto Rico, National Institutes of Health.	E. H. Hinman.
Theoretical Physics.....	University of Washington, Office of Naval Research, Air Force Office of Scientific Research.	John H. Manley.
Radiocarbon Dating.....	Robert S. Peabody Foundation for Archaeology.	Frederick Johnson.
Size and Shape of the Earth.	Ohio State University.....	W. A. Heiskanen.
International Ozone Conference.	Illinois Institute of Technology, Air Pollution Foundation, American Chemical Society.	Clark E. Thorp.
Gravitational Theory.....	University of North Carolina, Department of the Air Force, International Union of Pure and Applied Physics.	Bryce S. DeWitt.
Role of Botany in American Education.	Botanical Society of America.	Harriet Creighton.
Cellular and Humoral Aspects of Hypersensitive States.	New York Academy of Medicine.	H. Sherwood Lawrence.
Midwest Conference on Theoretical Physics.	State University of Iowa....	J. M. Jauch.
Archeological Identifications by Specialists in Related Disciplines.	National Academy of Sciences-National Research Council.	J. Charles Kelley.
7th Annual Conference on High-Energy Nuclear Physics.	University of Rochester, International Union of Pure and Applied Physics), Atomic Energy Commission, Office of Naval Research.	Robert E. Marshak.
Aging as a Biological Problem.	American Institute of Biological Sciences.	Nathan Shock and Bernard Strehler.
Scale of the Galaxy.....	Harvard College Observatory, Smithsonian Astrophysical Observatory.	Donald H. Menzel.
International Conference on Audiology.	Central Institute for the Deaf, Washington University.	S. R. Silverman.
Structure of Electrolytic Solutions.	Electrochemical Society.....	Henry B. Linford.

Scientific Conferences Sponsored and Supported by the National Science Foundation in Year Ending June 30, 1957—Continued

Subject	*Cosponsoring organizations*	*Chairman*
3d International Conference on Irrigation and Drainage.	U. S. National Committee of the International Commission on Irrigation and Drainage.	W. E. Blomgren.
3d Symposium on Cosmical Gas Dynamics.	Smithsonian Institution, International Union of Theoretical and Applied Mechanics, International Astronomical Union.	Jan M. Burgers.
Nuclear Geophysics.....	National Academy of Sciences-National Research Council.	P. M. Hurley.
22d Cold Spring Harbor Symposium on Quantitative Biology.	Carnegie Corporation, Atomic Energy Commission, Public Health Service, Milbank Memorial Fund, and The Population Council, Inc.	Bruce Wallace.
Problems of Tektites.....	National Academy of Sciences-National Research Council.	W. R. Thurston.
From Benzene to Graphite.	University of Buffalo, Office of Naval Research.	S. Mrozowski.
16th Growth Symposium...	Society for the Study of Development and Growth.	G. Fankhauser.

15th Growth Symposium

This symposium, held at Brown University in Providence, R. I., was attended by members of the various disciplines concerned with the study of growth who ordinarily do not meet together. Only a limited number of formal papers were given, so that much time was available for discussion. Subjects discussed were growth of viruses in cultured cells, relation of viruses to plant tumors, nature of the cell surface, endogenous rhythms in growth, origin of self-duplicating systems, problems of photosynthesis, and related topics. The meeting took place during July 1956. The chief concern of these symposia on growth is the synthesis of information resulting from the best of our basic research in biology.

Binary Stars

A Foundation-sponsored conference on binary stars brought together 22 astronomers at the Dominion Astrophysical Observatory, Victoria, British Columbia, in August 1956. Papers and discussions dealt with visual, eclipsing, and spectroscopic binaries, and stressed the importance

of observations of these stars as a foundation for the theoretical work on the origin and evolution of stars. Proceedings were published in the February 1957 issue of the *Journal of the Royal Astronomical Society of Canada.*

Hematology

The subject matter of this congress was divided equally between clinical and basic aspects of hematology. Sessions were held on basic subjects including platelet factors, fibrinogen and fibrinolysis, erythropoietic hormone and metabolic action of folic acid and vitamin B_{12}. The congress was held in Boston during the week of August 1956, and the attendance of 1,500 included scientists from many foreign countries.

Asphyxia Neonatorum

This conference was held in conjunction with the reopening for research purposes of the primate colony on Santiago Island. The meetings took place in September 1956 at the University of Puerto Rico. Approximately 15 to 18 scientists participated in the discussion of the scientific nature of asphyxia neonatorum brain damage and impairment of learning in experimental animals resulting from lack of oxygen in the newborn.

Theoretical Physics

This International Conference on Theoretical Physics was held in Seattle during September 1956. Representatives from several nations of Europe, Russia, the Far East, Mexico, and South America attended the conference. Discussions covered all of theoretical physics including the fields of quantum electrodynamics, astrophysics, magnetic resonance, molecular physics, nuclear physics, superfluidity, and solid state.

Radiocarbon Dating

In October 1956 a conference on radiocarbon and its application to dating problems in geology and archeology was held at Phillips Academy, Andover, Mass., under joint sponsorship of the Foundation and the R.

S. Peabody Foundation for Archaeology. Second of its kind sponsored by the Foundation, the conference provided a forum for the exchange of information in the several scientific fields concerned with the instrumentation or application of radiocarbon dating techniques. Sharing in the conference were more than 50 participants, including chemists, physicists, geologists, archeologists, and oceanographers from the United States, Europe, and Australia.

Size and Shape of the Earth

This conference was held at Ohio State University in November 1956 and was attended by about 100 scientists, representing more than 28 governments and private organizations. The purpose was to help make possible the conversions of the geodetic systems of the separate nations into a world geodetic system and to permit an exchange of information on recent advances in geodetic techniques, especially as they relate to activities of the International Geophysical Year. The conference was divided into four parts—(1) classical and modern "arc-measuring methods," (2) celestial methods, (3) world gravimetric system, and (4) world geodetic system.

Ozone

Ozone is one of the important compounds concerned with air pollution. In order to bring together leading authorities in the rapidly expanding field of ozone chemistry, and to disseminate current knowledge in the field, an International Ozone Conference was held at Chicago in November 1956. Nine eminent scientists who have contributed in this field in England, France, Germany, Hungary, Holland, Japan, and Switzerland participated actively in the conference which was attended by some 400 persons. Sixty papers were presented, and the proceedings will be published by the American Chemical Society.

Gravitational Theory

Classical relativity, quantization of general relativity with special emphasis on the elementary-particle problem, and mathematical techniques were the three essential topics of discussion at the Conference on Gravitational Theory held at Chapel Hill, N. C., in January 1957. It was jointly sponsored by the University of North Carolina, the Depart-

ment of the Air Force, the International Union of Pure and Applied Physics, and the Foundation. The conference permitted some 45 physicists, including 14 foreign participants, to exchange ideas and information about this most difficult subject. Conference papers will be published in the *Review of Modern Physics*.

Role of Botany in American Education

This conference on the "Role of Botany in American Education" was held under the auspices of the American Institute of Biological Sciences in Washington, D. C., in February 1957, and at Stanford University in August 1957. Principal topics considered at the conference were: (1) reasons for the decrease in numbers of college students electing botany courses; (2) wisdom or lack of wisdom in merging courses in botany and zoology; and (3) a sound curriculum for college botany courses.

Aspects of the Hypersensitive States

Within the past few years, renewed interest has been focused on the study of the basic immunological, physiological, and biochemical mechanisms underlying the hypersensitive states. Recent investigations in this very controversial field of allergy have resulted in significant progress in several areas, including the differentiation between allergic reactions involving circulating antibodies of the "reagin" type, and the development of methods for the study of hypersensitivity and the induction of the delayed hypersensitive state.

Although recent observations have provided new experimental approaches and rapidly changing concepts, these newer findings and ideas had not been assembled and correlated with previous knowledge in this area. The symposium was held for this purpose at the New York Academy of Medicine during March 1957. Papers were presented by 18 invited participants, including 4 European leaders in the field. The presented papers and discussions are being published.

Midwest Conference on Theoretical Physics

This conference was the second of its type to be held in the Midwest. The conference, being regional in character, provided an opportunity for theoreticians in the Midwest to come together and discuss problems

of current interest in physics. Topics discussed included nuclear theory, statistical mechanics, field theory, and fundamental particles. Four speakers, scientists of renown in their fields, reviewed and summarized the progress achieved during recent times in their fields of specialty. The conference was held during March 1957 at the State University of Iowa.

Archeological Identifications

This conference was held at the University of Chicago in March 1957. Approximately 30 individuals participated in this meeting, representing archeology, zoology, botany, geology, metallurgy, anthropology, paleontology, and physics. The three major topics discussed were: (1) identification of archeological specimens principally of a noncultural nature—procedures, problems, needs; (2) the specialists' position—problems involved in the identification of archeological materials; and (3) possibilities for improved procedures in archeologcal identification.

High-Energy Nuclear Physics

The Seventh Annual Conference on High-Energy Nuclear Physics was held in Rochester, N. Y., April 1957, under the joint sponsorship of the International Union of Pure and Applied Physics, the University of Rochester, the Atomic Energy Commission, the Office of Naval Research, and the Foundation. Seventh of its kind to be held in Rochester, and the fourth sponsored by the Foundation, these conferences have proven invaluable as an exchange of ideas between theoretical physicists, accelerator physicists, and cosmic-ray physicists working on elementary particles. In attendance were scientists from several foreign nations, including Poland for the first time.

Aging as a Biological Problem

Why do living things die? Why do they die when they do? How can these questions be answered? These three questions constituted the central theme of the conference, Aging as a Biological Problem, held in Gatlinburg, Tenn., in May 1957. Sponsored by the Foundation, the conference was called by the American Institute of Biological Sciences of Washington, D. C. Topics discussed included mortality

in populations, species differences in life span, genetic and developmental aspects of aging, environmental factors, changes in structure and function of tissues and cells, biochemical factors in aging, and theories of aging. A significant number of younger biologists, never before associated with the field of gerontology, participated. About 50 people, including several from abroad, attended.

Scale of the Galaxy

The symposium on the Scale of the Galaxy was held at Harvard Observatory in May 1957. Astronomers participated both in an informal session and in a symposium at the 97th meeting of the American Astronomical Society, attended by some 200 persons. Major problem in galactic astronomy today is the value of the Oort constant "A," which describes the kinematical properties of the galaxy of the solar neighborhood. Recent values range between 10 and 20 km/sec/kps. The central theme of the conference was a discussion of these discrepancies which are due to different distance scales.

International Conference on Audiology

An International Conference on Audiology was held in St. Louis in May 1957, under joint sponsorship of the Central Institute for the Deaf, the School of Medicine of Washington University, and the Foundation. Laboratory investigators shared views with their associates in the field and with an interested clinical audience on three principal topics: assessment of auditory function, physiology of audition, and the relation of hearing loss to noise exposure.

Structure of Electrolytic Solutions

An upsurge of activity during the past few years in the field of electrolytic solutions, encompassing both equilibrium and nonequilibrium aspects, led the Foundation to join with the Electrochemical Society in sponsoring a conference of interested scientists in Washington, D. C., in May 1957. In addition to United States scientists, 12 eminent scientists from other nations participated in the conference, representing Australia, England, Germany, Holland, Malaya, New Zealand, and Wales. The conference centered around discussion of recent theoretical and experimental advances in knowledge of the structure of electrolytic solu-

tions (those that conduct an electric current), with some emphasis on the kinetics of very fast electrolytic reactions. Papers presented at the conference will be published as a monograph by the Electrochemical Society.

Irrigation and Drainage

Approximately 40 nations sent delegates to the Third International Congress on Irrigation and Drainage, held in May 1957 in San Francisco. Much of the material presented described basic research which has been pursued throughout the world. The Congress was organized into four sessions devoted to canal lining, soil-water relationship in irrigation, hydraulic structures on irrigation and drainage systems, and interrelationship between irrigation and drainage. These congresses furnish the only medium through which the results of this type of research are publicized.

Cosmical Gas Dynamics

This interdisciplinary symposium was the third to be devoted to the subject of interstellar clouds. It was held in Cambridge, Mass., at the Astrophysical Observatory of the Smithsonian Institution in June 1957.

Nuclear Geophysics

This was the third in a series of conferences on the general subject of nuclear processes in geological settings. The subject of this conference was "Geological and Cosmological Implications of Isotope Variations." Attendance was limited to 35 specialists—physicists, chemists, geologists, astronomers, geochemists, and geophysicists—active in the field of age determination and isotope-ratio variations. Papers and discussions were devoted primarily to variations in isotope-ratios of elements in various terrestrial and meteoric environments. Proceedings will be published. The conference was held at the Massachusetts Institute of Technology, June 1957.

Population Ecology and Demography

The 22d Cold Spring Harbor Symposium on Quantitative Biology was held on Long Island, June 1957. It was devoted to a synthesis of present knowledge in various phases of experimental ecology, popula-

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tion genetics, and demography. Some 100 prominent ecologists, demographers, geneticists, and biostatisticians from the United States and 11 foreign countries attended the symposium.

Problems of Tektites

Tektites are naturally occurring fragments of fused silica glass whose shape and apparent melting history imply that they are of extraterrestrial origin. Their bulk chemical composition, however, closely approximates that of a fine-grained sedimentary rock and is significantly different from that of any known meteorite. Their origin, therefore, is of considerable importance to the theories of the history and evolution of the solar system. Jointly with the National Academy of Sciences-National Research Council, the Foundation sponsored a tektite conference in Washington, June 1957, in order that principal workers in the field might obtain more precise data on the composition and distribution of tektites.

From Benzene to Graphite

The Foundation joined the Office of Naval Research and the University of Buffalo in supporting a symposium entitled "From Benzene to Graphite," held in Buffalo in June 1957. The symposium, part of a larger conference on the structure of solid carbon, opened for critical discussion the state of knowledge concerning changes that occur when organic substances are transferred into graphite through the action of heat. The interest in solid carbon stems in part from its atomic simplicity which is in contrast to its complexity as a solid. Subjects discussed by physicists, engineers, and chemists at the symposium included electrical resistivity, Hall effect, thermoelectric effort, paramagnetic resonance, thermal conductivity, and mechanical strength.

16th Growth Symposium

The 16th Growth Symposium, the 5th consecutive one supported by the Foundation, took place at the University of Rhode Island at Kingston during June 1957. The theme of the symposium was Developmental Cytology: Changes in Nuclear and Cytoplasmic Constituents During Development and Differentiation. The proceedings will be published by the Princeton University Press as has been done with the previous symposia.

TRAINING AND EDUCATION IN THE SCIENCES

Functions of the Division of Scientific Personnel and Education are directed toward helping to maintain an adequate supply of well-trained, highly competent scientists and engineers. Attainment of this goal is sought through the operation of four principal programs: Fellowships, Scientific Manpower, Institutes, and Special Projects in Science Education.

Fellowship Program

The fellowship program is designed to strengthen the Nation's scientific potential by providing support for advanced training in the sciences directed toward the development of highly qualified research scientists, and for further study in the sciences directed toward increasing the competence of college science teachers. To meet these ends, the Foundation offers four types of fellowships. (Distribution of fellowship awards by scientific field is listed in Appendix D.)

Predoctoral

The objective of these awards to graduate students is to identify the most able science students interested in training beyond the baccalaureate degree in order to afford them opportunity to attend institutions which can provide the training most likely to develop their potential. Now in its sixth year, the predoctoral program is firmly established. During fiscal year 1957, 3,028 completed applications were received—2,568 from nonfellows and 460 from fellows requesting another award. Fellowship awards were made to 845 applicants.

Renewal applications were evaluated separately this year and not, as formerly, competitively with applications from nonfellows. Renewal applicants were granted another fellowship if their performance as fellows, in the judgment of their professors, had been equal to standards

expected of them. Another modification made during the year resulted in an increase in stipends for the three predoctoral levels—from $1,400, $1,600, and $1,800 per annum to $1,600, $1,800, and $2,000, respectively, for first-year, intermediate-year, and terminal-year fellows. The new stipend schedule was adopted, as well, by the National Institutes of Health in order to bring Federal fellowship programs into line with comparable programs and with present living costs.

Regular Postdoctoral

The objective of the Foundation's regular postdoctoral fellowships is to provide an opportunity to scientists of proven ability to increase their competence in their own fields and to broaden their experience in related fields. In fiscal year 1957, a total of 109 regular postdoctoral awards were made—25 in October 1956, chosen from among 87 applicants; 84 in March, chosen from among 395 applicants. Stipends were raised during the year from $3,400 to $3,800, simultaneously with a similar increase adopted by the National Institutes of Health.

Senior Postdoctoral

With the advent in the past year of the science faculty program oriented primarily toward improving science teaching, the objective of the senior postdoctoral program was restricted to providing an opportunity to senior, established scientists to increase their competence as investigators in their own or related fields. In its second year of operation of the senior postdoctoral program, the Foundation awarded a total of 55 senior postdoctoral fellowships—25 in October from among 136 applicants, and 30 in March from among 168 applicants.

Science Faculty

The objective of this program, initiated this year, is to provide opportunities for further study or work to college science teachers with a view to increasing their effectiveness as science teachers. Although there are today some 3 million college students in the United States, it is estimated that by 1965 college enrollments may be as high as 4.7 million. Not only more but better teachers will be required to cope successfully with such substantially increased enrollments. Many college teachers of science, mathematics, and engineering are drawn into teaching after having received only a nominal amount of post-baccalaureate training. Still others have been teaching for a long

time under conditions that have not been conducive to intellectual growth. The science faculty fellowship program is designed to:

1. Improve standards of college science instruction by providing teachers of science with opportunities for advanced study and for pursuing courses that will provide a better understanding and knowledge of their respective fields of science.
2. Focus attention on the crucial importance of increasing and improving our scientific manpower supply of faculty members concerned primarily with instruction.

During the year, the Foundation received 416 applications and awarded 100 science faculty fellowships.

Evaluation of Fellowship Selection Methods

The Foundation attempts in several ways to arrive at a careful evaluation of methods of operating its fellowship programs. During fiscal year 1957, the Bureau of Social Science Research, Washington, D. C., completed a study of questionnaires administered to the 1955–56 year class of predoctoral fellows and unsuccessful applicants. Data thus derived were compared with those from the 1952–53 and 1953–54 year classes. Findings of significance were:

1. The post-application history of unsuccessful applicants tends to parallel their ability ranking as judged by the evaluation panels.
2. The program has grown enormously in prestige.
3. A substantial percentage of students of graduate-school caliber report that the primary reason for failure to continue their education, at least in the following year, is lack of financial support.

Other evaluations of the Foundation's operation of its fellowship programs—notably those of the National Academy of Sciences-National Research Council and of the University of Minnesota—indicate that present selection methods are reliable. Other current studies are concerned with the validity of the selection methods.

Scientific Manpower Program

The Foundation has established, within its Division of Scientific Personnel and Education, two programs designed to provide the Federal Government with knowledge about the Nation's resources of scientific manpower—supply, demand, and utilization. These are the National Register of Scientific and Technical Personnel, and the Clearinghouse program.

National Register of Scientific and Technical Personnel

The Register is maintained by the Foundation cooperatively with the Nation's professional organizations of scientists and engineers. Its twofold purpose is to provide a quick index to numbers and kinds of scientific manpower in the event of emergency, and to serve as a source of data concerning manpower supply and characteristics. Today the Register contains in excess of 150,000 names of scientists and engineers. During fiscal year 1957, the Foundation began a complete statistical analysis of the characteristics of the 125,000 scientists in the Register. When completed, it will result in the most detailed and up-to-date description of this kind ever made concerning the scientific population. In cooperation with the Office of Scientific Personnel of the National Research Council, registration was begun during the year of all new science-doctoral-degree recipients.

Clearinghouse Program

This program serves as a central point in the Federal Government for collecting, interpreting, and disseminating information about the training and employment of, and demand for, scientific and technical personnel. As a result of its work in fiscal year 1957, the Clearinghouse published or prepared for publication the following:

Employment Profile of Scientists in the National Register of Scientific and Technical Personnel, 1954–55. A preliminary report on some 94,000 scientists in the Register including information on employment status, educational level, age, type of employer, employment function, and salaries.

Scientific Manpower—1956. Significant Developments, Views, and Statistics. A roundup of pertinent scientific manpower information for the year 1956. Includes papers from the Scientific Manpower Conference of AAAS, other selected papers, and pertinent statistical data.

A listing of a few of the research projects supported by the Foundation during the past year in the science manpower area indicates the scope of the Clearinghouse program for keeping currently informed.

1. Pilot Survey of Demand for Engineers in Selected Industries, by the Engineers Joint Council, to supplement its annual survey of demand for engineering graduates with a scientifically selected sample of firms in the petroleum, aircraft, and machinery industries.

2. Pilot Survey of Short-Term Demand for Scientists and Engineers, by the Bureau of Employment Security, U. S. Department of Labor, to determine whether valuable information on short-term demand for engineers and scientists can be collected through the BES employer-visit program.

3. Training of High School Teachers of Science and Mathematics, by the U. S. Office of Education, to determine training and actual teacher loads of high school teachers in a sampled area—Maryland, Virginia, and New Jersey. If successful, the Office of Education may undertake a nationwide sample.

4. The Assessment of Scientific Talent, by the University of Chicago, to help develop methods for identifying and selecting graduate students in the physical sciences.

Institutes Program

Three types of institutes providing supplementary subject-matter training for high school and college teachers of science and mathematics were supported by the Foundation in fiscal year 1957. These were (a) summer institutes for high school and college teachers, (b) academic-year institutes for high school teachers, and (c) in-service institutes for high school teachers.

Summer Institutes

Pursuant to strong congressional endorsement of the program, the number of summer institutes was greatly increased for the summer of 1957. Ninety-six summer institutes (See appendix C) were supported by the Foundation—87 for high school teachers of science and mathematics, 5 for college and junior college teachers of science and mathematics, and 4 for participants from both groups. The 96 institutes chosen for support were selected from a total of 189 proposals. Attendance at the institutes was slightly in excess of 5,300 teachers.

Review and evaluation of proposals was accomplished by advisory panels chosen from individuals recommended by the Nation's scientific societies as being highly qualified to render judgment in questions involving education in the sciences. Panel members represented all fields in the natural sciences, including mathematics; industrial as well as educational institutions; high school teachers and officials from State

departments of public instruction. Final selections carefully observed the directives from Congress "to avoid undue concentration" of support for education in the sciences.

During the summer of 1957, summer institutes were held in 43 States and in 3 Territories—Alaska, Hawaii, and Puerto Rico. There were 16 in New England and New York; 19 in the other Eastern States; 16 in the Southeast; 15 in the Midwest; 10 in the Rocky Mountain and Northwest region; 17 in the Southwest, including California; and 3 in the Territories.

Academic-Year Institutes

A total of 16 academic-year institutes, to begin in the fall of 1957, were supported by the Foundation in fiscal year 1957. Universities and colleges participating in this program are listed in appendix C. Most courses in science and mathematics offered by these schools are especially designed for the high school teacher who wishes to upgrade his training in the subject matter of the science or sciences he teaches. Most schools provide curricula leading to such degrees as master of science in science education. Approximately 775 teachers will be trained in the 1957–58 program. There were available appointments for only about 15 percent of those who applied. The Foundation plans to carry forward a program of essentially the same magnitude in academic year 1958–59.

In-Service Institutes

This is a new program for which support was first offered in fiscal year 1957. This kind of institute is designed to meet the needs of supplementary subject-matter training for teachers of science and/or mathematics while they are teaching. Meeting one evening per week or on Saturdays during the academic year, such institutes will usually provide approximately 4 semester-hours credit. Classes are generally small and participants are drawn from a 50-mile radius of the host institution. Fifty-nine proposals were received, and 21 were granted support to begin in the fall of 1957. Approximately 850 teachers are expected to attend. A list of in-service institutes is given in appendix C.

Special Projects in Science Education

In parallel with the institutes' program of the Foundation which the American Association for the Advancement of Science has called "one

of the most significant developments in teacher education in the past 20 years," the Foundation has developed other programs that are leading to improvement in science education. The Foundation is ever on the lookout for new ideas in this area. Some of the more profitable lines of approach, discussed below, have been supported by the Foundation during fiscal year 1957. They fall readily into three principal areas: (1) Curricula Studies, (2) Student-Participation Projects, and (3) Teacher-Training Projects.

Curricula Studies

These studies seek to respond to the concern, often expressed by scientists and educators, over failure of instructional programs in primary and secondary schools to arouse motivating interest in, and understanding of, the scientific disciplines. General agreement prevails that much of the science taught in schools today does not reflect the current state of knowledge nor does it necessarily represent the best possible choice of material for instructional purposes.

One of the most exciting activities in high school science education today concerns the development of an entirely new curriculum in physics for use in the high schools. This venture has been undertaken by a rather large group of senior physicists with a similar number of high school science teachers working together. This project happens to be under the administration of the Massachusetts Institute of Technology, although most of the staff comes from other schools. The first draft of the new textbook is completed and will be used and criticized by high school physics teachers prior to publication in first-edition form. Much progress has been made on the teacher's manual to accompany this text. An editorial board has been selected for consideration of monographs, several of which are now being prepared, looking toward a total of perhaps 200. These monographs will supplement and amplify the text material, including applied uses of physics. New laboratory demonstration experiments, using equipment easily made with cheap materials, are being devised. Small units are being developed for students to construct apparatus and do physics experiments outside the classroom when desired. Film presentations of difficult and unusual experiments, e. g., the pressure of light, are being made and tried. Although it may be 2 years before the entire curriculum is ready to be considered by the general high school teaching group, encouraging and very stimulating progress has been made.

Extensive and continuing efforts have been made to secure the cooperation and assistance of the professional educational organizations in this work.

It should perhaps be emphasized that the National Science Foundation has supported only the initial research phase of this program. Action by appropriate individuals leading toward a new organization to handle the development, production, and distribution phase has already been initiated. Contacts have been made with the American Society of Textbook Publishers and others who might have a commercial interest in these activities.

Under the direction of the National Academy of Sciences-National Research Council, a careful study is being made at Michigan State University of introductory courses in biology offered by colleges and universities, and a sourcebook in biology for high school teachers is being prepared.

In the area of teaching aids, the Foundation is supporting studies of the possible use of motion picture films for instructing mathematics; of what we might glean that is original and creative in the teaching of mathematics in the secondary schools of other countries; and of laboratory procedures used in college courses in physics.

Other curricula studies supported by the Foundation during the year included: a conference on the undergraduate mathematics curriculum at Hunter College; a conference on the education of chemists at Johns Hopkins University; and a series of conferences in several Kentucky colleges to study the curricula for science instruction in elementary and secondary schools.

Student Participation Projects

These projects are planned to increase interest in and understanding of science by students at all educational levels. Examples of the kinds of projects supported by the Foundation during the past year include the following:

1. The Traveling Science Library Program.—Operated jointly with the American Association for the Advancement of Science, this program attempts to enrich the understanding of science by students at the small high schools by making available, on a loan basis, well-written books on science. During the 1956–57 school year, 25 libraries of 200 volumes each reached 100 of these high schools. This program is being increased to 54 libraries which are expected to visit 200 small high schools during the 1957–58 school year.

2. THE TRAVELING SCIENCE DEMONSTRATION LECTURE PROGRAM.—Supported jointly with the Atomic Energy Commission and administered by the Oak Ridge Institute of Nuclear Studies, it permitted 7 experienced high school teachers to be given 3 months of specialized training at Oak Ridge in subject matter and in the construction of simple apparatus to demonstrate scientific principles. Sets of such special demonstration equipment were then transported in station wagons to some 200 high schools all over the country. Lectures with demonstrations were given stressing the scientific principles involved in such subjects as solar radiation, atomic structure, nuclear reactors, space travel, and other subjects of scientific interest.

During the 1956–57 school year, more than 78,000 high school students heard the lectures and some 3,700 high school science teachers were reached by the program. In the 1957–58 school year, 10 science teachers (who were given special training during the preceding summer) will visit some 300 high schools to give similar lecture demonstrations. (See p. 32.)

3. THE VISITING SCIENTISTS PROGRAM.—This program enables eminent scientists to visit small colleges for periods of several days to talk with students and faculty about recent developments and career opportunities in the fields of the visitors' professional competence. Although the visiting scientists' program was begun in the field of mathematics, it has been extended to include chemistry, physics, and biology. A new feature—visits to some high schools—has now been added in the hope that contact with distinguished men of science will be of interest and inspiration to high school students. Reports from participating scientists and from officials of institutions visited affirm the success of the program.

4. FILMS FOR INSTRUCTIONAL PURPOSES.—Three half-hour-length, color films on aspects of the International Geophysical Year are being prepared to provide an opportunity for developing interest in science and to acquaint young people with the meaning and scope of the IGY. The films will be made available to schools and colleges, and to television stations, as a contribution to science education.

5. OTHER STUDENT PARTICIPATION PROJECTS.—Included are projects, such as the support of distribution of thousands of brochures describing career opportunities in the life sciences and designed to awaken student interest; studies of ways in which the Foundation can best provide assistance to State academies of science in furthering their interests in science education; studies designed to gather dependable information on the effects of science scholarship awards on student re-

cipients; and continuation of support to Science Service to sustain its program of information for young people about the several fields of science and to encourage them to begin science projects through the Science Clubs of America.

Teacher-Training Projects

These projects include all those special programs for teachers designed to improve science teaching with the exception of the previously mentioned institutes. Three significant examples will serve to indicate the scope and objectives of these projects.

1. Opportunities for secondary school teachers to pursue research studies in their fields of interest are severely limited because of inadequate library resources, lack of facilities, and absence of adequate supervision. To increase the effectiveness of teachers by broadening their knowledge of their fields of professional interest, the Foundation in fiscal year 1957 initiated two pilot programs to bring competent high school teachers into research laboratories of colleges and universities to undertake modest research studies in subjects of their own choosing.

2. The rapid development of computing machines and their usefulness in a wide variety of research investigations have created a demand for persons trained in the use and operation of computers. Although such training may be considered a proper responsibility of colleges and universities, there is a severe shortage of teachers competent to give instruction. The Foundation has provided support for a program of training for experienced mathematicians on the faculties of colleges and universities to prepare them to develop courses of instruction in the use and operation of modern computing machines.

3. Experimental programs were developed at both Duke and Purdue Universities for the training of retired military personnel to teach mathematics in colleges and secondary schools.

Evaluation Studies

Evaluation of experimental activities, such as those found in Special Projects in Science Education, is essential to effective program planning. Greatly increased attention was given to evaluation during this year. The techniques of appraisal varied with the programs, but the character of the programs dictated that the evaluations would be mostly attempts to gain unprejudiced judgments of their effectiveness from experienced and able observers. This evaluation activity is directed at all programs in science education, not merely those characterized

above as Special Projects in Science Education. Progress was made in the following programs:

1. THE SUMMER INSTITUTES PROGRAM.—Earlier evaluations of summer institutes had been obtained by visits of staff members and by questionnaires filled in by the participants. While these techniques were again employed during fiscal year 1957, the effort was bolstered by a set of interviews of institute participants late in the school year after they had returned to their home schools. These interviews, although done on a small scale, brought out that teachers were making very good use of their institute experience. This study was carried out by the Bureau of Social Science Research, and a report was made to the Foundation.

A larger study has been designed for interviewing ex-participants one school-year later. Science Research Associates of Chicago is directing this evaluation, which involves 300 high school teachers who attended the 1956 summer institutes. In addition, the same organization directed a program of visits to one-third of the 1957 summer institutes by panels of distinguished scientists for direct observation and evaluation of the operations of summer institutes. Supplementing these more formal evaluations is a program of staff visits to many of the 1957 summer institutes to study operational and other problems.

Plans are also underway for a continuing estimate of the caliber of applicants to the summer institutes through analysis of the data on their application blanks. By comparing the experience and previous education of all applicants, both those accepted and those rejected, over a period of years, changes in the background of the applicants can be detected and determinations can be made as to their varied needs.

2. THE VISITING SCIENTISTS PROGRAM.—Reports have been received from the scientists who have participated in these programs—often detailed and comprehensive. In addition, there have been reports from many of the institutions visited describing the effectiveness of the programs and the benefits which have been derived from them. The response to the early programs has been such as to create demand for the expansion of the program into additional fields.

3. TRAVELING SCIENCE DEMONSTRATION LECTURERS.—Each participating teacher makes a weekly evaluative report on student response. Appraisal letters are also received from teachers and administrators in the schools visited. An integrated report based upon these appraisals has not yet been completed, but many unsolicited letters of appreciation have been received from teachers and school principals concerning the effectiveness of the visits.

In addition to the foregoing, spontaneous letters from persons who have heard of the program and wish to have it brought to their communities provide evidence of the usefulness of the program. A picture story about the program in *Life* magazine attests to its timeliness and general interest. Additional subjective evaluation has been made by NSF staff members who have observed the program in operation. As evidence of the significance of this project in the science educational programs of the States, 12 States now are planning to have a teacher trained in the program next summer so that science lecture demonstrations may be made available on a more adequate scale to the schools within the State boundaries.

4. TRAVELING SCIENCE LIBRARIES.—An evaluation of this program is being undertaken by the American Association for the Advancement of Science. The AAAS has completed a study of circulation records of books used in the 1955–56 program. Each book in the library has a book pocket in which there is placed a standard library circulation card. Each time the book units are transferred to another school, the circulation cards are removed and sent to AAAS in Washington and the school receiving the unit inserts a new set of cards. After a study of these cards, certain books in the 1955–56 library were replaced with other volumes judged to be more appropriate or more likely to prove of interest.

This program has been enthusiastically received by science teachers, students, and school administrators. Teachers report that the volumes are in constant use and that the effect upon student interest has been gratifying. The best evidence of the impact of the program is that some counties are appropriating funds for the maintenance of similar libraries for their own schools and that members of local communities have found ways of providing funds for this purpose. Although only 366 of the 25,000 high schools in this country will have received the libraries by the end of the present school year, the number is sufficient to make the usefulness of science books widely appreciated and to serve as a catalyst for further support from counties and local and State agencies.

Although not constituting a formal evaluation in any sense, it should be mentioned that the program has been commended by the executive secretary of the American Association of School Libraries. Also, local chambers of commerce and civic organizations have on occasion expressed interest in buying the books for their schools. In general, the response to the program has been such that it is being expanded both in the number of books included and in the number of schools to which it will be made available.

EXCHANGE OF SCIENTIFIC INFORMATION

Primary objective of the Office of Scientific Information is to insure in every possible way the continuing availability of scientific information to the scientists. Mindful of the fact that the sheer volume of published research is creating new problems as it increases day by day, the Office is fostering studies aimed at improving existing methods and developing new methods of handling scientific information. The use of more efficient methods will permit scientists to spend more of their time in creative research. Furthermore, the Office helps make available to scientists the results of the work of other scientists, at home or abroad. Work of the Office is divided among three programs—Foreign Science Information, Government Research Information, and Scientific Documentation.

Foreign Science Information Program

Goal of this program is to achieve the most effective, practicable dissemination, in the United States, of scientific research results published in foreign languages. At present its emphasis is almost exclusively on Russian scientific literature.

All the foreign scientific publications which a United States scientist may need should be readily available to him in the United States, regardless of the language or nation in which the publication first appeared. The most important of these foreign works should be translated in full into English and made available to scientists through the normal channels of scientific communication. Availability of translations, as well as the foreign publications not translated, should be called to the attention of scientists through publication of English abstracts. Through a translation collection, announcement, and reference center, translations prepared by individuals, companies, universities, and Government agencies should be made generally available. These activities should be supplemented where necessary by publication of finding lists, union lists, and other bibliographic aids designed to increase the speed and effectiveness of searches of the scientific literature.

During the past year, the Foundation's efforts in making foreign scientific information available consisted of support for the following activities.

Collections of Source Publications

Two grants were made to the Midwest Inter-Library Center (MILC) in Chicago, a cooperative endeavor of 18 major Midwest universities and research libraries. The grants will assist MILC in establishing comprehensive collections of chemical and biological serial publications. One will enable MILC to obtain between 700 and 800 serial titles of chemical interest, largely publications not readily obtainable in the United States, to add to the roughly 4,000 chemical serial titles already held by its members. The other will assist members of the center to identify specifically the biological serial literature which may be missing from their already extensive collections. Although there exist large collections of literature in the fields of chemistry and biology, MILC will be the first organization which, as a matter of policy, bases its acquisition on publications covered by the principal abstract journals, *Chemical Abstracts* and *Biological Abstracts,* used by United States scientists.

Complete Translations of Journals and Books

Grants were made to the American Geophysical Union and to the American Institute of Biological Sciences to expand the Foundation program of support for publication of English editions of Russian scientific journals. These, with the continuing support of translations by the American Institute of Physics, brought to a total of nine the journal translation programs in effect at the end of fiscal year 1957. They are as follows:

Title	*Grantee*
1. Journal of Experimental and Theoretical Physics.	American Institute of Physics.
2. Journal of Technical Physics.	
3. Physics Section of the DOKLADY of the Academy of Sciences of the USSR.	
4. Acoustical Journal.	
5. Microbiology.	American Institute of Biological Sciences.
6. Plant Physiology.	
7. Biology and Botany Sections of the DOKLADY of the Academy of Sciences of the USSR.	
8. Geophysics Series of the IZVESTIIA of the Academy of Sciences of the USSR.	American Geophysical Union.
9. Soviet Geophysical Abstracts.	

Grants were also made during the year for translating three important Russian monographs—one in physical chemistry, and two in biology. The titles and publishers are:

Title	*Grantee*
1. Semenov, M. *Some Problems of Chemical Kinetics and Reactivity.*	Princeton University Press.
2. Takhtadjian, A. L. *Essay on the Evolutionary Morphology of Plants.*	American Institute of Biological Sciences.
3. Takhtadjian, A. L. *Origin of the Angiosperms.*	American Institute of Biological Sciences

Abstracting

A grant was made to *Biological Abstracts* to continue its program for translating roughly 2,400 translated Russian abstracts per year. These abstracts are chosen from 31 primary Russian biological journals, and the translations are published as part of the regular service to *Biological Abstracts.* In addition, a grant was made to the International Council of Scientific Unions Abstracting Board to support its program to encourage and assist international cooperation in scientific abstracting.

Translation Depositories

During the year the Special Libraries Association (SLA) Translation Center at the John Crerar Library in Chicago absorbed the activities of the Russian Scientific Translation Center at the Library of Congress. Library personnel, professional societies, and Government agencies concerned agreed that an integrated center was in the best interests of the Nation's scientists. The Foundation made a grant to SLA to effect the transfer of functions from the Library of Congress and to support the new center for a year. Later in the year, the National Institutes of Health extended support, and it is expected that joint support will continue into next year.

With 10,000 translations on hand, the new center expanded its holdings and services rapidly during the year. It now publishes a 52-page monthly list of translations received, and at the end of the fiscal year its holdings were nearly 15,000. The subscription list to *Translation Monthly* is now nearly 1,000.

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Bibliographic Aids and Supporting Studies

A grant was made to the Library of Congress for publication of a list of titles of scientific and technical serial publications currently received. Because of its extensive exchange arrangements with foreign organizations, Library accessions of foreign scientific publications are undoubtedly the largest and most important in the United States.

Another grant was made to the Library of Congress to support a study by its Science Division of the status of the Library with reference to Japanese scientific and technical publications. The study is expected to provide guidance for establishing projects to improve the use of Japanese scientific publications similar to projects now under way concerned with Russian publications.

Government Research Information Program

Fundamental objective of the Government research information program is to achieve maximum availability to scientists, both in and out of Government, of the significant unclassified scientific reports on Government-supported basic research. Considerable assurance that the objective is being attained is evident in the results of three activities concerning which there is now a measurable accomplishment record of about one year. These activities include (a) a grant to the Office of Technical Services, Department of Commerce, which enables scientists to learn of the existence of Government research results by subscribing to a report abstracting service, and establishes a mechanism for the actual purchase of listed reports; (b) a grant to the Science Division, Library of Congress, which provides a reference collection of unclassified scientific reports on basic research which any scientist can consult; and (c) a Clearinghouse within the Foundation to provide counsel and guidance to scientists who seek Government-generated scientific research information.

Office of Technical Services, Department of Commerce

For several years the Office of Technical Services has issued *United States Government Research Reports,* a listing and annotation of research reports primarily directed to the interests of business and industry. The Foundation grant enabled OTS to be just as active in basic research reports as it had been in technical reports in applied and engineering fields. Although circulation of the OTS *Reports* and sales of copies

of reports have been increasing each year, growth during fiscal year 1957 was substantial enough to justify a belief that the Foundation grant had played an important role. The effect of the Foundation grant on number of titles announced in *Reports* is clear:

1. During the first 6 months of fiscal year 1957 (too soon for the Foundation grant to have affected results appreciably), *Reports* listings totaled about 900 titles in the 15 subject categories most likely to include basic research projects; the corresponding figure for the last half of fiscal 1957 was about 1,200—an increase of 33 percent.
2. Total *Reports* listings for fiscal year 1956 and fiscal 1957 were 2,970 and 3,472, respectively—an increase of 17 percent.

Science Division, Library of Congress

By the end of fiscal year 1957, the report reference collection established in the Library of Congress with Foundation support included 16,000 cards which concerned unclassified scientific reports on basic research. Scientists' use of the collection is steadily increasing as the catalog becomes more nearly complete and more widely known.

Government Research Information Clearinghouse

The Government Research Information Clearinghouse within the Foundation is a service available to any scientist, in or out of Government, to help him in his search for information regarding where in Government, or where under Government sponsorship, research in a given field is being conducted; whether unclassified reports have been issued on the work; and, if so, how he can obtain access to copies. Although the service has been offered for somewhat less than a year, it has already been considerably helpful to research scientists. From about mid-September 1956, the Clearinghouse had received some 695 queries—451 for further information about the service, 244 for subject data in one field or another. The 244 divide roughly into 100 in the biological sciences, 84 in chemistry, and 60 in physics. In reply, the Clearinghouse cited a total of 4,350 Government-supported research projects and 737 specific reports.

The Clearinghouse, as well, maintains bibliographic control of reprints received by the Foundation of publications by grantees on research supported under Foundation grants. *Publications Resulting from NSF Research Grants—Through the Fiscal Year Ending June 30, 1956* (NSF–57–4) was published in May 1957, listing some 1,250 publications by grantees in 130 institutions in 43 States, and covering the

period from the establishment of the Foundation. The corresponding compilation for fiscal year 1957 appears as appendix G of this report.

As an aid to the effective operation of the Clearinghouse, the Foundation granted $15,000, in January 1957, to the Technical Information Division, Library of Congress, to prepare a subject index of Department of Defense unclassified scientific research reports. Estimates indicate that it will contain some 40,000 entries. As the fiscal year ended, negotiations were underway among Federal agencies concerned to obtain authorization for the Office of Technical Services to print the index and offer it for sale on the same basis as its other documents.

Scientific Documentation Program

Two principal objectives characterize the work of the scientific documentation program—(a) the long-range objective to encourage and support research that will provide a sound basis for the design of new and better techniques and systems for organizing and searching scientific knowledge; and (b) the comparatively short-range objective to help to maintain and, where possible, to strengthen and improve present means of publishing and disseminating results of scientific research.

Research for accomplishing the first task is divided into three categories:

1. Studies undertaken to provide deeper understanding of the present pattern of scientific communication and of inadequacies in current means open to scientists for keeping up with advances and for making retrospective searches of the scientific record.
2. Research on principles of organizing or classifying scientific information so that high-speed searching machines can be used to best advantage.
3. Research on language structure and meaning, and on special coding techniques that will make possible development of mechanized systems for translating from one language to another.

The relatively short-range objective is accomplished primarily by grants for the partial support of scientific publications, such as research journals, highly significant books, and reference works of various kinds. Some support is given to information centers that provide scientists with specialized reference services. In addition, grants are made for publication studies and experiments with a view toward devising more efficient and economical means of publishing and disseminating new scientific knowledge.

Scientific Information Research

In this aspect of its program activities, the Foundation seeks ways to satisfy the requirements of scientists for more efficient and effective means of storing, searching, and disseminating scientific information. The Foundaton is supporting two studies using different techniques to identify more precisely the information needs of scientists so that information retrieval systems and methods of disseminating may be designed to provide types of required information in the form most useful to scientists.

1. Case Institute of Technology: Application of the techniques of operations research to a study of the pattern of communication among scientists and their use of recorded information.

2. Columbia University Bureau of Applied Social Research: A study to determine occasions of information exchange and the characteristics of information-gathering patterns in a university environment by means of intensive interviews of faculty members in three of the science departments.

The most promising approach to improving ways in which scientists obtain information is the use of high-speed electronic machines to make rapid searches through existing knowledge in order to select either the particular piece of information sought or all known information on any particular topic. Here, however, much fundamental research is needed on principles of organizing information for rapid searching and on techniques for analyzing scientific materials for entry into mechanized storage and search systems. Furthermore, to prepare large amounts of information for machine searching it is necessary to devise mechanized means of translating the original language in which the information is recorded into a more regularized language that can be coded for the machines. To this end, the Foundation supported the following projects during fiscal year 1957:

1. University of Pennsylvania: A study of the feasibility of using a formal linguistic method of analysis (which might itself be mechanized) to simplify the sentence structure of scientific texts in processing them for mechanized information storage and search systems.

2. An independent investigator in Washington, D. C.: Analysis of words and phrases in scientific documents leading to the demonstration of a possible system for mechanized information searching, which would employ a regularized English. Dictionaries and thesauruses, which might also be mechanized, would be used to translate the original lan-

guage of the document or question to the regularized language of the system.

In the field of machine translation, the Foundation is supporting research at three institutions:

1. Massachusetts Institute of Technology: Research leading to precise knowledge of German and English sentence structure and word order; and formulation and testing of rules for instructing a machine to translate German sentences into correct English.

2. Georgetown University Institute of Languages and Linguistics: Analysis of syntactic patterns and of the use and meaning of words in a large sample of Russian material in the field of organic chemistry, resulting in the development and testing of machine programs for translating Russian sentences into accurate and grammatical English.

3. Cambridge Language Research Unit, Cambridge, England: Investigation of the possibility of basing machine translation on algebraic processes so that the correct phrase structures and word order in the target language can be calculated mathematically. The possibility of devising a mechanized thesaurus to produce idiomatic translations is also being explored.

In addition, the Foundation sponsors research conferences in the interests of improving communication among scientists.

1. In September 1956, the Foundation sponsored an international research conference on machine translation at the Massachusetts Institute of Technology. Representatives from England, Canada, and the United States exchanged progress reports, and Russian researchers sent two papers describing their work.

2. The Foundation will cosponsor with the National Academy of Sciences-National Research Council, and the American Documentation Institute, and International Conference on Scientific Information to be held in Washington, D. C., in November 1958. Representatives from several nations plan to participate in a thorough discussion of the current status of, and future plans for, research on all aspects of scientific documentation.

Support of Scientific Publications and Reference Centers

While seeking the most effective ways to store, search, and disseminate the published results of research, the Foundation meanwhile attempts, in this phase of its program activity, to maintain existing publication programs and information services on a solid footing. Publication of

research results is the initial usable product of research—results do not add to the general knowledge until they are available to other scientists. Yet scientific publication is becoming increasingly difficult in the face of soaring printing costs and the constantly growing volume of research results that should be published. The publication-support program of the Foundation is concerned with studies of scientific publication policies, techniques, and problems; emergency support of important research journals; and support for the publication of valuable books and reference works.

During fiscal year 1957, the Foundation supported a conference of editors of biological journals to examine publication costs; possibilities of using new media; and abstracting, editorial, and selection problems. It resulted in establishment of a continuing Conference of Biological Editors to meet once a year to review reports of several committees designated to seek solutions to specific publication problems. Support was extended, as well, to the American Institute of Physics for the preparation of a manual for authors of papers to be published in physics journals. The manual will help to establish proper and consistent usage of technical terms, symbols, abbreviations used in physics and related fields, and will deal with form and usage in scientific writing, preparation of material for printing or reproduction, and allied problems. As a result, it should ease editors' burdens, save the time of authors, and make communication more precise.

The Foundation occasionally provides emergency support for valuable scientific journals, either to help with publication of a large backlog of accumulated papers or to help meet a deficit while steps are taken to increase the journal's income so that publication may be continued on a self-supporting basis. During the year such support was extended to the *Journal of Comparative and Physiological Psychology,* the *Journal of Experimental Psychology,* the *Transactions of the American Mathematical Society,* the *Michigan Mathematical Journal* and *Applied Mechanics Reviews.* A new *Journal of Limnology and Oceanography* received a small sum to cover the deficit resulting from its first year of operation; it is expected to be self-supporting in another year or two.

For several years the Foundation, and other Federal agencies, helped support *Biological Abstracts,* largest and most important abstracting journal in the biological sciences. Although it was anticipated that the journal would need further help this year, its publishers advised the Foundation that previous support had brought about a currently sound operation and further emergency support was not necessary.

Examples of important reference works that received partial Foundation support during the year are: a nine-volume *Compendium of Astronomy and Astrophysics;* a 60-year index to *The Bryologist; World Weather Records, 1941–1950* and *Glossary of Geology and Related Sciences.*

Examples of information centers that received support are the Bio-Sciences Information Exchange of the Smithsonian Institution and the Human Relations Area Files.

INTERNATIONAL GEOPHYSICAL YEAR

During the past year, the International Geophysical Year, a worldwide scientific cooperative venture involving some 64 nations, completed its preparations and is now ready to begin its active program of geophysical observations through a vast network of more than 1,000 stations. The observations beginning July 1, 1957 will extend through December 31, 1958, and will be coordinated both in time and geographical coverage. The planning and execution of the United States program for the IGY is being conducted by the U. S. National Committee for the International Geophysical Year and a group of related technical panels. This committee was created by the National Academy of Sciences-National Research Council. Funding and Government coordination are provided by the National Science Foundation.

The United States plans observational programs in aurora and airglow, 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

During this year additional international meetings refined programs, solved special needs of specific geophysical disciplines, and completed plans for the initiation of the World Data Center system.

The IGY Western Hemisphere Regional Conference, held in Rio de Janeiro, Brazil, July 16–20, 1956, stimulated interest in the IGY in Latin American nations, completed agreements for reporting and communication, and strengthened many scientific collaborations, notably in meteorology, oceanography, geomagnetism and seismology.

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A third Antarctic Regional Conference was held in Paris, France, July 30–August 3, 1956, which concerned itself primarily with communications and meteorology.

The CSAGI (Comité Spécial de l'Année Géophysique Internationale of the International Council of Scientific Unions) held its fourth meeting at Barcelona, Spain, September 10–15, 1956. Final coordination of many disciplines was achieved, including the addition of certain stations to cover geographical gaps. A symposium was held on rockets and satellites, and considerable attention was devoted to IGY publications planning.

CSAGI convened a working group on oceanography at Göteborg, Sweden, January 15–17, 1957. Planning for multi-nation, multiple-ship oceanographic surveys was completed, and plans for measurement of carbon dioxide concentration in the air and ocean were enlarged. In addition, considerable attention was devoted to the inclusion of measurements of natural and manmade isotopes present in the air and ocean.

A meeting of the CSAGI on nuclear radiation held in Utrecht, Holland, January 22–26, 1957, made recommendations concerning the inclusion in the IGY program of studies of nuclear radiation, including measurements in the upper atmosphere and the oceans, and recommended the establishment of stations for this purpose.

A Western Pacific Regional Conference was held in Tokyo, Japan, February 25–March 2, 1957. This conference was primarily useful in the establishment of better communications and in beginning possible multilateral arrangements between the national committees in the Western Pacific region to deal with problems common to the area. Emphasis was laid on oceanography, geomagnetism, cosmic rays, and upper atmosphere rocketry.

A CSAGI meeting on world data centers was held in Brussels, Belgium, April 1–4, 1957. Plans for the establishment of three world regional centers, one in the United States, were confirmed, and considerable progress made in the defining and standardizing of the IGY data to be lodged in these centers. The needs of individual disciplines were coordinated, with particular attention to meteorology.

A fourth Antarctic meeting was held in Paris, June 12–15, 1957, primarily to consider the possibility of a third year of scientific observations in the Antarctic, provided general concurrence could be obtained among the 11 nations with active programs in that region. In addition, special communications problems were dealt with.

The United States IGY program is well in hand, and with very few and minor exceptions, all equipment and personnel were at the stations

in time to begin the 1-month pre-IGY testing period which began June 1, 1957. Without changing any basic structures or projects, minor modifications will continue to take place when any opportunity to better performance offers itself.

World Data Centers

Planning has proceeded for the creation of an IGY World Data Center to be located in the United States. The United States center will be 1 of 3 which are now planned, a second one being located in the U. S. S. R., and a third center divided between Western Europe, Japan, and Australia. The probable structure for the United States World Data Center will be a series of geophysical discipline data archives for which responsibility will be assigned to certain universities and Federal agencies. A data coordination office was established in Washington, D. C. in June 1957, to coordinate the activities of these several archives.

Progress in the Antarctic

Navy expedition "Deep Freeze II" transported all scientific and logistic equipment and materiel for the establishment of the Weddell Sea, Knox Coast, and Cape Adare Stations to the Antarctic, and also the United States scientific party for the first year's operations.

All six United States scientific stations are now established and fully manned. The main United States IGY station is Little America V. This station had been established in the previous year and the materiel for the Marie Byrd station and the South Pole station had been transported to the Antarctic then.

During this year's operations the Marie Byrd station was established, partly by oversnow tractor parties and partly by airlift. The United States station on the Knox Coast (now named "Wilkes IGY Station"), the station on the Weddell Sea (now named "Ellsworth IGY Station"), and the station at Cape Adare (joint cooperative station with New Zealand, now named "Hallett IGY Station"), were established by ships of Expedition Deep Freeze II.

The South Pole station was established completely by airlift, and on January 22, 1957, in joint ceremonies with representatives from Norway and the United Kingdom, this station was dedicated as the Amundsen-Scott South Pole IGY Station.

The IGY International Antarctic Weather Central is now in operation at the Little America Station. Meteorologists from Argentina and the U. S. S. R. are assisting in the work of this important unit.

The following persons are the principal scientists directing the United States IGY Antarctic program:

Laurence Gould.....Director of the U. S. IGY Antarctic Program.
Harry Wexler.....Chief scientist of the IGY Antarctic Program.
A. P. Crary.....Deputy chief scientist and scientific leader at Little America IGY Station.
G. R. Toney.....Scientific leader at Byrd IGY Station.
C. R. Eklund.....Scientific leader at Wilkes IGY Station.
Capt. Finn Ronne, USNR.....Scientific leader at Ellsworth IGY Station.
J. A. Shear.....Scientific leader at Cape Adare IGY Station.
Paul A. Siple.....Scientific leader at Amundsen-Scott IGY South Pole Station.

Seventy-three scientists are wintering over at these six stations. Buildings, equipment, and men are ready to carry out all projects planned in the United States IGY Antarctic Program.

Progress in the Continental and Equatorial Regions

Cooperative projects with the South American countries have been augmented, particularly in the fields of geomagnetism and ionospheric physics. The establishment of meteorological, geomagnetic, and oceanographic stations in the Pacific Ocean has proceeded smoothly, including a cooperative venture with France at Tahiti. Arrangements for the rocket firing to be conducted at Guam have been completed.

Earth Satellite

Responsibility for the United States earth satellite program was assigned as follows:

1. The National Science Foundation for Government coordination and funding of the scientific aspects of the program.

2. The United States National Committee for the International Geophysical Year for the planning of the program's scientific aspects.

3. The Department of Defense for the development of a launching vehicle and for the actual placing of the satellite in orbit, also for the development of radio tracking and telemetering equipment with the Navy as manager of these aspects. In turn, the Naval Research Laboratory was given the executive responsibility for carrying out the Department of Defense assignment.

During the fiscal year, two test firings of the launching vehicle took place. The first test vehicle was fired on December 8, 1956, from Patrick Air Force Base, Fla., and the second test vehicle was fired on May 1, 1957. Both test firings were satisfactory.

Radio tracking stations have been established, and equipment designed by the Naval Research Laboratory is now being installed and calibrated. Personnel for the operation of these stations are being trained by the Naval Research Laboratory at the prototype station at Blossom Point, Md.

Some of the optical tracking stations have been established by the Smithsonian Institution and negotiations are being completed with certain foreign countries for the support of optical tracking stations to be established overseas. Final contracts for the super-Schmidt optical cameras have been let, and delivery of these cameras will proceed rapidly in the next fiscal year. The "Moonwatch" volunteer visual observing program, being conducted by the Smithsonian Institution, has exceeded expectations. A total of 85 units have been set up in the United States and numerous units are being set up overseas. Several practice drills using high-flying aircraft have taken place.

The "Vanguard" launching vehicle which will place the scientific satellite in orbit is a large, multiple rocket approximately 72 feet long and with a maximum diameter of 45 inches. It is composed of three firing stages, with the satellite sphere mounted on the forward end of the third stage and suitably protected from atmospheric heating by a nose cone which will be discarded after the vehicle is above the denser portions of the atmosphere. The vehicle is finless, since flight directional control is attained by placing the rocket engines of the first and second stages in gimbal mounts which allow change of thrust angle. The first and second stages use liquid fuel and the third stage is a solid propellant rocket. The entire vehicle weighs aproximately 11 tons.

This large launching device will project a sphere 20 inches in diameter and weighing 21½ pounds into an elliptical orbit around the earth at an inclination of approximately 35° to the Equator. The probable orbit will confine the satellite to a minimum distance of 200 miles from the earth and a maximum distance of 1,500 miles. The combined effects of the inclination of the orbit to the Equator, the time period in which the satellite completes a passage of its orbit, and the rotation of the earth will cause the satellite to pass over all portions of the earth between 35° north latitude and 35° south latitude, provided its orbital life is sufficiently long. The life of the orbit may vary from several weeks to several years, depending upon the altitude reached and the

physical environment at that altitude. Six firings are planned in the present program.

As a research tool, the earth satellite has been compared in importance to the telescope and the particle accelerator. It will extend man's direct observational abilities to altitudes and regions now denied him. It will allow direct measurement of physical conditions in the neighborhood of the satellite; it will allow measurement of incoming radiation and particles before they are strongly affected by the earth's atmosphere and magnetic and electric fields; and it will allow direct and unobstructed observation of our sun and its behavior.

Four basic scientific payloads for the earth satellite are near completion and will soon be ready for the severe mechanical and thermal testing which all satellite components will undergo. The experiments contained in these four payloads include: solar far-ultraviolet radiation measurements; measurement of micrometeoritic erosion of satellite shell by two different experimental techniques; measurements of primary cosmic radiation; measurement of the earth's magnetic field; and measurement of basic meteorological phenomena, such as the albedo of the earth or determination of the net radiation balance of the earth. Additional experiments are being designed and constructed to back up the four basic scientific payloads.

These direct measurements of solar radiation, the density of matter along the path of the satellite, the numbers and intensities of cosmic rays impinging upon the earth, the strength of the earth's magnetic field at satellite altitudes, the electron density of the electrified layers of the atmosphere, the radiation received and re-emitted by the earth and its atmosphere, the possible detection of variations in the earth's crustal structure, and the more accurate determination of the earth's shape and size and the location of the continents upon its surface will be uniquely valuable in themselves. In addition, they will confirm indirect measurements already made on or near the surface of the earth, help to prove or disprove theories and speculations about these terrestrial phenomena, and, finally, will form a basis for the planning and utilization of more sophisticated scientific satellites in the future.

Test firings will continue, with a view of placing fully instrumented satellites into orbit during the IGY.

Conclusion

The IGY program is proceeding smoothly in full accordance with all scientific principles enunciated by CSAGI (the international co-

ordinating body) and taking into account all scientific recommendations made by CSAGI in the process of coordinating the programs of the 64 nations participating. As the IGY begins its active measuring period, the scientists who lead this venture will turn their thoughts more and more to the problems of making the fullest possible use of the scientific data which will be obtained during this 18-month observational period.

Appendices

APPENDIX A

National Science Board, Staff, Committees, and Advisory Panels

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WILLIAM W. HOWELLS, Department of Anthropology, Harvard University, Cambridge, Mass.

GEORGE P. MURDOCK, Department of Anthropology, Yale University, New Haven, Conn.

RUPERT B. VANCE, Department of Sociology, University of North Carolina, Chapel Hill, N. C.

SHERWOOD WASHBURN, Center for Advanced Study in the Behavioral Sciences, Stanford, Calif.

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PAUL HERGET, Cincinnati Observatory, Cincinnati, Ohio.

GEOFFREY KELLER, Perkins Observatory, Ohio Wesleyan University, Delaware, Ohio.

W. W. MORGAN, Yerkes Observatory, University of Chicago, Williams Bay, Wis.

CELILIA PAYNE-GAPOSCHKIN, Harvard Observatory, Harvard University, Cambridge, Mass.

LYMAN SPITZER, Jr., Princeton Observatory, Princeton University, Princeton, N. J.

JOEL STEBBINS, Lick Observatory, University of California, Mount Hamilton, Calif.

PETER VAN DE KAMP, Sproul Observatory, Swarthmore College, Swarthmore, Pa.

Advisory Panel for Chemistry

PAUL D. BARTLETT, Department of Chemistry, Harvard University, Cambridge, Mass.

RALPH A. BEEBE, Department of Chemistry, Amherst College, Amherst, Mass.

A. B. BURG, Department of Chemistry, University of Southern California, Los Angeles, Calif.

PAUL C. CROSS, Department of Chemistry, University of Washington, Seattle, Wash.

F. R. DUKE, Department of Chemistry, Iowa State College, Ames, Iowa.

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

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

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RALPH O. ERICKSON, Department of Botany, University of Pennsylvania, Philadelphia, Pa.

* WILLIAM P. JACOBS, Department of Biology, Princeton University, Princeton, N. J.

A. M. SCHECHTMAN, Department of Zoology, University of California, Los Angeles, Calif.

NELSON T. SPRATT, Department of Zoology, University of Minnesota, Minneapolis, Minn.

* TAYLOR A. STEEVES, Biological Laboratories, Harvard University, Cambridge, Mass.

ALBERT TYLER, Department of Embryology, California Institute of Technology, Pasadena, Calif.

*Served during part of fiscal year 1957.

Advisory Panel for Earth Sciences

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.

H. H. HESS, Chairman, Department of Geology, Princeton University, Princeton, N. J.
M. KING HUBBERT, Chief Research Consultant, Shell Oil Co., Houston, Tex.
HELMUT LANDSBERG, Chief, Division of Climatology, U. S. Weather Bureau, Washington, D. C.
WALTER H. MUNK, Scripps Institution of Oceanography, La Jolla, Calif.
BRYAN PATTERSON, Division of Geological Sciences, Harvard University, Cambridge, Mass.
WILLIAM T. PECORA, U. S. Geological Survey, Washington, D. C.
RICHARD J. RUSSELL, Dean of Graduate School, Louisiana State University, Baton Rouge, La.

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HARMER E. DAVIS, Director, Institute of Transportation and Traffic Engineering, University of California, Berkeley, Calif.
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JOHN HOLLOMON, Manager, Metal Research Department, General Electric Co., Schenectady, N. Y.
R. C. JORDAN, Head, Department of Mechanical Engineering, University of Minnesota, Minneapolis, Minn.
FREDERICK C. LINDVALL, Chairman, Division of Engineering, California Institute of Technology, Pasadena, Calif.
ABEL WOLMAN, Department of Sanitary Engineering, Johns Hopkins University, Baltimore, Md.

Advisory Panel for Environmental Biology

*W. D. BILLINGS, Department of Botany, Duke University, Durham, N. C.
MURRAY F. BUELL, Department of Botany, Rutgers University, New Brunswick, N. J.
THEODORE H. BULLOCK, Department of Zoology, University of California, Los Angeles, Calif.
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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ARTHUR D. HASLER, Department of Zoology, University of Wisconsin, Madison, Wis.

ROBERT E. HUNGATE, Department of Bacteriology, University of California, Davis, Calif.

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

*C. LADD PROSSER, Department of Physiology, University of Illinois, Urbana, Ill.

PAUL B. SEARS, Conservation Program, Yale University, New Haven, Conn.

Advisory Panel for Genetic Biology

*VERNON BRYSON, Institute of Microbiology, Rutgers University, New Brunswick, N. J.

EVERETT R. DEMPSTER, Department of Genetics, University of California, Berkeley, Calif.

H. BENTLEY GLASS, Department of Biology, Johns Hopkins University, Baltimore, Md.

*JOSHUA LEDERBERG, Department of Genetics, University of Wisconsin, Madison, Wis.

HERSCHEL K. MITCHELL, Department of Biology, California Institute of Technology, Pasadena, Calif.

MARCUS M. RHOADES, Department of Botany, University of Illinois, Urbana, Ill.

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JOHN F. FULTON, School of Medicine, Yale University, New Haven, Conn.

R. B. LINDSAY, Department of Physics, Brown University, Providence, R. I.

RICHARD H. SHYROCK, Institute of 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.

H. F. BOHNENBLUST, Department of Mathematics, California Institute of Technology, Pasadena, Calif.

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RICHARD BRAUER, Department of Mathematics, Harvard University, Cambridge, Mass.

W. L. MASSEY, Department of Mathematics, Brown University, Providence, R. I.

DEANE MONTGOMERY, Department of Mathematics, Institute for Advanced Study, Princeton, N. J.

MINA REES, Dean, Hunter College, New York, N. Y.

PAUL C. ROSENBLOOM, Department of Mathematics, University of Minnesota, Minneapolis, Minn.

R. L. WILDER, Department of Mathematics, University of Michigan, Ann Arbor, Mich.

Advisory Panel for Molecular Biology

BERNARD AXELROD, Department of Biochemistry, Purdue University, Lafayette, Ind.

STANLEY CARSON, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.

MAX DELBRÜCK, Division of Biology, California Institute of Technology, Pasadena, Calif.

VINCENT DETHIER, Department of Biology, Johns Hopkins University, Baltimore, Md.

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DAVID SHEMIN, Department of Biochemistry, 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, Department of Physics, University of Michigan, Ann Arbor, Mich.

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

W. K. H. PANOFSKY, Department of Physics, Stanford University, Stanford, Calif.

JAMES RAINWATER (Nevis Cyclotron Laboratories), Columbia University, New York, N. Y.

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

LLOYD P. SMITH, President of Research and Advanced Development Division, Avco Manufacturing Corp., New York, N. Y.

CLARENCE ZENER, Westinghouse Electric Corp., Research Laboratories, East Pittsburgh, Pa.

Advisory Panel for Psychobiology

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

QUINN MCNEMAR, Department of Psychology, Stanford University, Stanford, Calif.

CONRAD G. MUELLER, The Rockefeller Institute for Medical Research, New York, N. Y.

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

H. E. ROSVOLD, Laboratory of Psychology, National Institute of Mental Health, Bethesda, Md.

BENTON J. UNDERWOOD, Department of Psychology, Northwestern University, Evanston, Ill.

DELOS D. WICKENS, Department of Psychology, Ohio State University, Columbus, Ohio.

Advisory Panel for Regulatory Biology

R. H. BURRIS, Department of Biochemistry, University of Wisconsin, Madison, Wis.

JACKSON W. FOSTER, Department of Bacteriology, University of Texas, Austin, Tex.

*RALPH W. GERARD, Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.

*STERLING HENDRICKS, Bureau of Plant Industries, U. S. Department of Agriculture, Beltsville, Md.

RACHMIEL LEVINE, Department of Metabolic Research, Michael Reese Hospital, Chicago, Ill.

WILLIAM D. MCELROY, McCollum-Pratt Institute, Johns Hopkins University, Baltimore, Md.

*ROLAND K. MEYER, Department of Biology, University of Wisconsin, Madison, Wis.

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.

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*Served during part of fiscal year 1957.

*GEORGE SAYERS, Department of Pharmacology, Western Reserve University, Cleveland, Ohio.

BRADLEY T. SCHEER, Department of Biology, University of Oregon, Eugene, Oreg.

KENNETH V. THIMANN, Biological Laboratories, Harvard University, Cambridge, Mass.

C. B. VAN NIEL, Hopkins Marine Station, Pacific Grove, Calif.

Advisory Panel on Scientific Manpower Information

JAMES W. COLE, Jr., School of Chemistry, University of Virginia, Charlottesville, Va.

HAROLD GOLDSTEIN, Division of Manpower and Employment Statistics, Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.

ALBERT KAY, Office of Manpower Supply, Department of Defense, Washington, D. C.

CHARLES V. KIDD, Research Planning Branch, National Institutes of Health, Bethesda, Md.

RAY W. MAYHEW, Owens-Illinois Glass Co., Toledo, Ohio.

JAMES C. O'BRIEN, Department of Health, Education, and Welfare, Washington, D. C.

PHILIP N. POWERS, Internuclear Co., Clayton, Mo.

M. H. TRYTTEN, Director, National Academy of Sciences—National Research Council, Washington, D. C.

J. FLETCHER WELLEMEYER, American Council of Learned Societies, Washington, D. C.

DAEL WOLFLE, American Association for the Advancement of Science, Washington, D. C.

Advisory Panel for Social Science Research

CLARK KERR, Chancellor, University of California, Berkeley, Calif.

CLYDE KLUCKHOHN, Department of Social Relations, Harvard University, Cambridge, Mass.

DONALD G. MARQUIS, Chairman, Department of Psychology, University of Michigan, Ann Arbor, Mich.

HAROLD W. STOKE, Dean, Graduate School of Arts and Science, New York University, New York, N. Y.

SAMUEL S. WILKS, Department of Mathematics, Princeton University, Princeton, N. J.

DONALD R. YOUNG, General Director, Russell Sage Foundation, New York, N. Y.

Advisory Panel for Systematic Biology

JOHN N. COUCH, Department of Botany, University of North Carolina, Chapel Hill, N. C.

*Served during part of fiscal year 1957.

ALFRED E. EMERSON, Department of Zoology, University of Chicago, Chicago, Ill.

*ROBERT K. ENDERS, Department of Zoology, Swarthmore College, Swarthmore, Pa.

LIBBIE H. HYMAN, American Museum of Natural History, New York, N. Y.

DAVID D. KECK, New York Botanical Garden, Bronx Park, New York, N. Y.

REMINGTON KELLOGG, Director, U. S. National Museum, Washington, D. C.

ROGERS MCVAUGH, University Museums Building, University of Michigan, Ann Arbor, Mich.

*CHARLES D. MICHENER, Department of Entomology, University of Kansas, Lawrence, Kans.

KARL P. SCHMIDT, Chicago Natural History Museum, Chicago, Ill.

WILLIAM C. STEERE, Department of Biological Sciences, Stanford University, Stanford, Calif.

NORMAN R. STOLL, Rockefeller Institute for Medical Research, New York, N. Y.

SPECIAL ADVISORY PANELS

Advisory Panel for Astronomical Observatory

I. S. BOWEN, Director, Mt. Wilson and Palomar Observatories, California Institute of Technology, Pasadena, Calif.

LEO GOLDBERG, Department of Astronomy, University of Michigan, Ann Arbor, Mich.

ROBERT R. MCMATH, McMath-Hulbert Observatory, University of Michigan, Pontiac, Mich.

BENGT STROMGREN, Director, Yerkes and McDonald Observatories, University of Chicago, Williams Bay, Wis.

OTTO STRUVE, Berkeley Astronomical Department, University of California, Berkeley, Calif.

A. E. WHITFORD, Director, Washburn Observatory, University of Wisconsin, Madison, Wis.

Advisory Panel for Hawaiian Geophysical Institute

P. H. ABELSON, Director, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D. C.

CARL ECKART, Scripps Institution of Oceanography, La Jolla, Calif.

E. A. ECKHARDT, Gulf Research & Development Co., Pittsburgh, Pa.

LEO GOLDBERG, Department of Astronomy, University of Michigan, Ann Arbor, Mich.

CECIL GREEN, Geophysical Services, Inc., Dallas, Tex.

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*Served during part of fiscal year 1957.

HARRY H. HESS, Chairman, Department of Geology, Princeton University, Princeton, N. J.
M. KING HUBBERT, Shell Oil Co., Houston, Tex.
SVERRE PETTERSSEN, Department of Meteorology, University of Chicago, Chicago, Ill.
W. W. RUBEY, U. S. Geological Survey, Washington, D. C.
JOHN C. WARNER, President, Carnegie Institute of Technology, Pittsburgh, Pa.

Advisory Panel for High Energy Accelerators

SAMUEL K. ALLISON, Department of Physics, University of Chicago, Chicago, Ill.
LELAND J. HAWORTH, Brookhaven National Laboratory, Upton, N. Y.
EDWARD J. LOFGREN, Radiation Laboratory, University of California, Berkeley, Calif.
WOLFGANG K. PANOFSKY, Department of Physics, Stanford University, Palo Alto, Calif.
ISIDOR I. RABI, Department of Physics, Columbia University, New York, N. Y.
ARTHUR ROBERTS, Department of Physics, University of Rochester, Rochester, N. Y.
FREDERICK SEITZ, Department of Physics, University of Illinois, Urbana, Ill.
ROBERT SERBER, Department of Physics, Columbia University, New York, N. Y.
MELTON G. WHITE, Department of Physics, Princeton, N. J.
JOHN H. WILLIAMS, Department of Physics, University of Minnesota, Minneapolis, Minn.
JERROLD R. ZACHARIAS, Department of Physics, Massachusetts Institute of Technology, Cambridge, Mass.

Advisory Panel on High Polymer Research

J. H. DILLON, Textile Research Institute, Princeton, N. J.
J. D. FERRY, University of Wisconsin, Madison, Wis.
PAUL J. FLORY, Mellon Institute for Industrial Research, Pittsburgh, Pa.
FRANK R. MAYO, Stanford Research Institute, Menlo Park, Calif.
THERALD MOELLER, University of Illinois, Urbana, Ill.
CARL C. MONRAD, Carnegie Institute of Technology, Pittsburgh, Pa.
CHARLES G. OVERBERGER, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

Advisory Panel on Radio Astronomy

BART J. BOK, Harvard College Observatory, Cambridge, Mass.
JOHN PETER HAGEN, Naval Research Laboratory, Washington, D. C.

R. MINKOWSKI, Mt. Wilson and Palomar Observatories, Pasadena, Calif.
JESSE L. GREENSTEIN, California Institute of Technology, Pasadena, Calif.
JOHN D. KRAUS, Ohio State University, Columbus, Ohio.
E. M. PURCELL, Harvard University, Cambridge, Mass.
M. A. TUVE, Carnegie Institution of Washington, Washington, D. C.

Advisory Panel for University Computing Facilities

HERBERT L. ANDERSON, Institute for Nuclear Studies, University of Chicago, Chicago, Ill.
JULE G. CHARNEY, Meteorology Department, Massachusetts Institute of Technology, Cambridge, Mass.
GERALD M. CLEMENCE, Director, Nautical Almanac, U. S. Naval Observatory, Washington, D. C.
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.
J. BARKLEY ROSSER, Department of Mathematics, Cornell University, Ithaca, N. Y.
MARTIN SCHWARZSCHILD, Department of Astronomy, Princeton University, Princeton, N. J.
EDWARD TELLER, Department of Physics, University of California, Berkeley, Calif.
S. M. ULAM, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, Mass.

Advisory Panel for University Research Reactors

HENRY GOMBERG, Assistant Director, Michigan Memorial Phoenix Project, University of Michigan, Ann Arbor, Mich.
LAWRENCE R. HAFSTAD, Vice President, General Motors Corp., Detroit, Mich.
J. B. PLATT, President, Harvey Mudd College, Claremont, Calif.
LAWRENCE REGINALD QUARLES, University of Virginia, Charlottesville, Va.
CHAUNCEY STARR, North American Aviation Co., Los Angeles, Calif.
JOHN ARTHUR SWARTOUT, Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. P. WIGNER, Department of Physics, Princeton University, Princeton, N. J.
RAYMOND E. ZIRKLE, Department of Biology, University of Chicago, Chicago, Ill.

APPENDIX B

Grants for Basic Research

Fiscal Year 1957

Anthropological and Related Sciences

University of California, Berkeley, Calif.; Joseph B. Birdsell, Department of Anthropology, Los Angeles, Calif.; *Microevolutionary Processes Among Australian Aborigines;* 3 years; $9,200.

University of California, Berkeley, Calif.; Robert F. Heizer, Department of Anthropology; *Archaeology and Prehistory of the Western Great Basin;* 2 years; $10,100.

University of Chicago, Chicago, Ill.; F. Clark Howell, Department of Anthropology; *Prehistoric Living Site of Acheulian Man in Central Tanganyika;* 1 year; $9,400.

Columbia University, New York, N. Y.; W. D. Strong, Department of Anthropology; *Interrelations of Environment and Culture at a Stratified Archaeological Site in Western Great Plains;* 1 year; $5,900.

University of Illinois, Urbana, Ill.; Gerhardt von Bonin, Department of Anatomy, College of Medicine, Chicago, Ill.; *Encephalometry of the Australopithecines;* 1 year; $2,300.

Johns Hopkins University, Baltimore, Md.; William L. Straus, Jr., Laboratory of Physical Anthropology; *Studies on Primate Evolution;* 2 years; $18,000.

Massachusetts Institute of Technology, Cambridge, Mass.; Marvin E. Shaw, School of Industrial Management; *Interaction Effects of the Structure of a Group;* 2 years; $8,300.

University of Michigan, Ann Arbor, Mich.; Frederick P. Thieme, Department of Anthropology; *Biochemical and Immunological Analysis of Human Skeletal Remains;* 2 years; $10,600.

University of Oregon, Eugene, Oreg.; Luther S. Cressman, Department of Anthropology; *Oregon Coast Prehistory: An Archaeological Study;* 1 year; $5,800.

University of Pennsylvania, Philadelphia, Pa.; Carleton S. Coon, The University Museum; *The Races of the World;* 2 years; $7,500.

University of Pennsylvania, Philadelphia, Pa.; Dorothy S. Thomas, Department of Sociology; *Migration Differentials;* 1 year; $15,000.

Smithsonian Institution, Washington, D. C.; Ralph S. Solecki, Bureau of American Ethnology; *Archaeology and Human Paleontology of Shanidar Cave;* 1 year; $1,500.

Stanford University, Stanford, Calif.; Bernard J. Siegel, Department of Anthropology; *Disintegration Processes in a Southwest Pueblo;* 2 years; $11,000.

Texas Technological College, Lubbock, Tex.; Fred Wendorf, Department of Anthropology; *Archaeological and Ecological Study of Late Pleistocene and Early Recent Deposits;* 1 year; $15,500.

University of Utah, Salt Lake City, Utah; Gordon D. Gibson, Department of Anthropology; *Ethnology of the Southwestern Bantu;* 1 year; $3,900.

University of Wisconsin, Madison, Wis.; David A. Baerreis, Department of Sociology and Anthropology; *Interrelations of Biological and Cultural Change;* 1 year; $15,700.

YALE UNIVERSITY, New Haven, Conn.; Edward M. Bruner, Department of Anthropology; *Batak Anthropology;* 1 year; $3,800.

Astronomy

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Kenneth L. Franklin, Department of Astronomy; *Spectrum of the Radio Frequency Radiation From Jupiter;* 1 year; $10,000.

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Edwin F. Carpenter, Stewart Observatory; *Cooperative Search for Supernovae;* 2 years; $16,000.

ASSOCIATED UNIVERSITIES, INC., New York, N. Y.; Richard M. Emberson; *Studies Leading to the Establishment of a Radio Observatory;* 3 months; $80,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Otto Struve, Department of Astronomy; *Evolution of Close Binary Stars;* 2 years; $34,400.

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Victor M. Blanco, Department of Astronomy; *Giant M-Stars as Members of the Galactic Disk;* 1 year; $5,650.

UNIVERSITY OF CHICAGO, Chicago, Ill.; G. Van Biesbroek, Department of Astronomy; *Astrometric Investigations;* 1 year; $5,200.

UNIVERSITY OF CHICAGO, Chicago, Ill.; W. A. Hiltner, Department of Astronomy; *Interstellar Magnetic Field in the Vicinity of the Sun;* 2 years; $12,300.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Gerard P. Kuiper, Department of Astronomy; *Investigations Toward a Photographic Lunar Atlas;* 2 years; $5,700.

UNIVERSITY OF CHICAGO, Chicago, Ill.; G. P. Kuiper, Department of Astronomy; *Solar System Studies;* 1 year; $15,600.

UNIVERSITY OF CHICAGO, Chicago, Ill.; W. W. Morgan and Bengt Stromgren, Department of Astronomy; *Distribution of Interstellar Dust;* 2 years; $18,600.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Paul Herget, Director, The Cincinnati Observatory; *Minor Planet Elements;* 3 years; $14,850.

DARTMOUTH COLLEGE, Hanover, N. H.; George Z. Dimitroff, Department of Mathematics and Astronomy; *Solar Activity Related to Ionospheric Phenomena;* 2 years; $5,800.

HARVARD UNIVERSITY, Cambridge, Mass.; T. K. Menon, Harvard College Observatory; *Radio Astronomy in the Microwave Region;* 6 months; $25,000.

HAVERFORD COLLEGE, Haverford, Pa.; Louis C. Green, Department of Astronomy; *High Accuracy Atomic Wave Functions;* 2 years; $5,000.

HIGH ALTITUDE OBSERVATORY OF THE UNIVERSITY OF COLORADO, Boulder, Colo.; Gordon A. Newkirk, Jr.; *Analysis of the Solar Electron Corona;* 1 year; $10,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Stanley P. Wyatt, Department of Astronomy; *Orientation of Galaxies in Space;* 1 year; $1,750.

INDIANA UNIVERSITY, Bloomington, Ill.; James Cuffey, Department of Astronomy; *Observations of Asteroids;* 2 years; $12,400.

INDIANA UNIVERSITY, Bloomington, Ind.; Halton C. Arp, Department of Astronomy; *Photometric Study of the Small Magellanic Cloud;* 3 months; $1,300.

INDIANA UNIVERSITY, Bloomington, Ind.; Marshal H. Wrubel, Department of Astronomy; *Astrophysical Problems;* 1 year; $8,500.

LOWELL OBSERVATORY, Flagstaff, Ariz.; William M. Sinton, Astronomer; *Infrared Spectrum of the Planets and Moon;* 2 years; $14,700.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Lawrence H. Aller, Department of Astronomy; *Early-Type Stars and Gaseous Nebulae;* 2 years; $9,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Robert McMath, McMath-Hulbert Observatory; *Studies Leading to the Establishment of American Astronomical Observatory;* 15 months; $545,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Robert R. McMath, McMath-Hulbert Observatory; *Studies Leading to the Establishment of an American Astronomical Observatory;* 1 year; $60,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Willem J. Luyten, Department of Astronomy; *Purchase of "Astronomical Research Equipment";* 1 year; $8,000.

MARIA MITCHELL OBSERVATORY, Nantucket, Mass.; Dorrit Hoffleit, Director; *Observations of Variable Stars;* 1 year; $5,200.

OHIO STATE UNIVERSITY, Columbus, Ohio.; John D. Kraus, Department of Electrical Engineering; *Background Mapping and Individual Source Studies;* 1 year; $25,300.

OHIO STATE UNIVERSITY, Columbus, Ohio; Philip C. Keenan, Department of Astronomy; *An All-Mirror Cassegrain Spectrograph for Astronomical Research;* 2 years; $17,500.

OHIO STATE UNIVERSITY, Columbus, Ohio; Philip C. Keenan, Department of Astronomy; *Design and Construction of a Spectrograph for Research Between 3,500 A and 12,000 A;* 1 year; $12,500.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; N. E. Wagman, Director, Allegheny Observatory; *Observation of Spectroscopic Binaries;* 1 year; $5,750.

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; Robert Fleischer, Department of Physics; *Radio Astronomy;* 1 year; $10,000.

UNIVERSITY OF TEXAS, Austin, Tex.; Frank N. Edmonds, Jr., Department of Mathematics and Astronomy; *Spectrophotometric Analysis of Procyon;* 1 year; $1,500.

UNIVERSITY OF WISCONSIN, Madison, Wis.; A. E. Whitford, Department of Astronomy; *A General-Purpose Spectrograph for Astronomical Research,* 2 years; $14,000.

YALE UNIVERSITY, New Haven, Conn.; Dirk Brouwer, Director, Yale University Observatory; *Studies Related to the Establishment of a Large Astrographic Telescope in the Southern Hemisphere;* 2 years; $41,400.

YALE UNIVERSITY, New Haven, Conn.; Morris S. Davis, Department of Astronomy; *Satellite Orbits and the Mass of Saturn;* 1 year; $6,500.

Chemistry

ALBION COLLEGE, Albion, Mich.; Philip R. Marshall, Department of Chemistry; *Kinetics of Gas-Solid Reactions;* 3 years; $9,700.

UNIVERSITY OF AKRON, Akron, Ohio; Maurice Morton, Department of Chemistry; *Mechanism of Heterogeneous Addition Polymerization;* 2 years; $35,800.

UNIVERSITY OF AKRON, Akron, Ohio; *Equipment Grant for High Polymer Research.*

AMHERST COLLEGE, Amherst, Mass.; Ralph A. Beebe, Department of Chemistry; *Thermodynamics of Adsorbates on Solids;* 2 years; $22,800.

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; Arthur Fry, Department of Chemistry; *Use of Infrared Spectroscopy in Organic Chemistry;* 2 years; $7,000.

BAYLOR UNIVERSITY, Waco, Tex.; W. R. Stephens, Department of Chemistry; *Reaction Studies in Organic and Electro-Chemistry;* 1 year; $3,800.

BRIDGEWATER COLLEGE, Bridgewater, Va.; Lowell V. Heisey, Department of Chemistry; *Reduction of Sulfonamides and Preparation of Imides and Cyclic Hydrazides;* 1 year; $1,000.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; H. Smith Broadbent, Department of Chemistry; *Precision Polarimetry in Organic Chemistry;* 2 years; $5,400.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; J. Rex Goates, Department of Chemistry; *Energies of Mixing of Monelectrolytes;* 2 years; $9,300.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; H. Tracy Hall, Department of Chemistry; *Ultra High-Pressure, High-Temperature Research;* 2 years; $25,500.

BOSTON UNIVERSITY, Boston, Mass.; Norman N. Lichtin, Department of Chemistry; *Equilibria in Non-Aqueous Media;* 2 years; $18,200.

BOSTON UNIVERSITY, Boston, Mass.; J. Philip Mason, Department of Chemistry; *Studies in Phototropy Ammonia Solution;* 1 year, $8,000.

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; Howard Tieckelmann, Department of Chemistry; *Synthesis of Analogs of the Vitamin B_1 Pyrimidine;* 3 months; $2,800.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Harden M. McConnell, Department of Chemistry; *Chemical Rates by Magnetic Resonance Methods;* 3 years; $18,800.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; W. F. Giaque, Department of Chemistry; *Thermodynamic and Magnetic Properties at Low Temperatures;* 3 years; $207,300.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Daniel Kivelson, Department of Chemistry; *Paramagnetic Resonance in Free Radicals;* 2 years; $13,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Chester T. O'Konski, Department of Chemistry; *Molecular Polarization and Interactions;* 2 years; $18,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Kenneth S. Pitzer, Department of Chemistry; *Nuclear Magnetic Resonance Spectra Studies in Physical Chemistry;* 2 years; $10,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; L. J. Andrews and R. M. Keefer, Department of Chemistry, Davis, Calif.; *Steric Problems in Complex Formation and Electrophilic Substitution Reactions of Aromatic Substances;* 3 years; $15,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Harold G. Reiber, Department of Chemistry, Davis, Calif.; *Kinetics of Organic Reactions;* 2 years; $7,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Conway Pierce, Department of Chemistry, Riverside, Calif.; *Analytical, Organic, and Physical Chemistry;* 3 months; $5,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; W. Conway Pierce, Department of Chemistry, Riverside, Calif.; *Mass Spectrometric Studies of Organic Reaction;* 1 year; $9,900.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; William G. Young, Department of Chemistry, Los Angeles, Calif.; *Displacement Reactions Involving Allylic Systems;* 3 years; $20,000.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert G. Parr and Frank O. Ellison, Department of Chemistry; *Electronic Structure of Molecules;* 3 years; $40,700.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert T. Holmes, Department of Chemistry; *Investigation of Pentacoordinated Molecules;* 1 year; $5,400.

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; *Equipment Grant for High Polymer Research.*

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Peter Kovacic, Department of Chemistry and Chemical Engineering; *Reaction of Metal Halides with Aromatic Compounds;* 3 years; $12,900.

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Samuel H. Maron, Department of Chemistry; *Rheology of Suspensions of Spherical Particles and of Polymer Solution;* 2 years; $34,500.

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Equipment Grant for High Polymer Research.*

UNIVERSITY OF CHICAGO, Chicago, Ill.; Morris S. Kharasch, Department of Chemistry; *Chemistry of Polymerization and the Chemical Properties of Polymers;* 1 year; $59,900.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Earl A. Long, Institute for the Study of Metals; *Properties of Matter at Low Temperatures;* 3 years; $56,500.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Milton Orchin, Department of Chemistry; *Infrared Spectrophotometric Studies of Inorganic and Organic Systems;* 2 years; $7,000.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Milton Orchin, Department of Chemistry; *Mechanism of Selenium-Catalyzed Dehydrogenations;* 2 years; $13,300.

COLUMBIA UNIVERSITY, New York, N. Y.; Cheves Walling, Department of Chemistry; *Free Radical Reactions;* 3 years; $38,300.

CORNELL UNIVERSITY, Ithaca, N. Y.; Alfred T. Blomquist, Department of Chemistry; *Molecular Rearrangements in Medium-sized Carbocycles;* 2 years; $15,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; Peter J. Debye, Department of Chemistry; *Polymers in Strong Electrical Fields and Porous Media Flows;* 1 year; $58,200.

CORNELL UNIVERSITY, Ithaca, N. Y.; Paul J. Flory, Department of Chemistry; *Properties of Polymers and Their Solutions;* 1 year; $53,900.

CORNELL UNIVERSITY, Ithaca, N. Y.; A. W. Laubengayer, Department of Chemistry; *Synthesis and Characterization of Inorganic Polymers;* 3 years; $33,800.

CORNELL UNIVERSITY, Ithaca, N. Y.; F. A. Long, Department of Chemistry; *Nuclear Magnetic Resonance Studies in Physical and Organic Chemistry;* 1 year; $15,000.

CORNELL UNIVERSITY, Ithaca, N. Y.; Jerrold Meinwald, Department of Chemistry; *Interaction of Carbonyl Groups.With Electrophilic Centers;* 2 years; $12,600.

UNIVERSITY OF DENVER, Denver, Colo.; Earl A. Engle, Department of Chemistry; *Mandelic Acid Precipitation of Zirconium;* 3 months; $2,200.

EMORY UNIVERSITY, Emory University, Ga.; Leon Mandell, Department of Chemistry; *Total Synthesis of Nootkatin and Related Tropolones;* 2 years; $9,000.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Karl Dittmer, Department of Chemistry; *Kinetic and Equilibrium Studies With Nuclear Magnetic Resonance Spectroscopy;* 2 years; $15,000.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; WERNER HERZ, Department of Chemistry; *Sesquiterpene Chemistry;* 3 years; $18,300.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; H. M. Walborsky, Department of Chemistry; *Cyclopropylcarbinyl Rearrangement;* 3 years; $15,700.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; William H. Cramer, Department of Electrical Engineering; *Collisions of Positive Ions With Gases;* 2 years; $14,500.

GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; Earling Grovenstein, Jr., Department of Chemistry; *Fractionation of Hydrogen Isotopes During Electrophilic Aromatic Halogenation;* 2 years; $16,000.

GRINNELL COLLEGE, Grinnell, Iowa; Joseph D. Danforth, Departmnt of Chemistry; *Oxide and Acid Catalysts;* 2 years; $5,400.

HARVARD UNIVERSITY, Cambridge, Mass.; William Klemperer, Department of Chemistry; *Infrared Spectroscopy at High Temperatures;* 1 year; $5,300.

HARVARD UNIVERSITY, Cambridge, Mass.; Frederick C. Uhle, Department of Pharmacology; *Chemistry of Indole Compounds;* 2 years; $14,900.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; L. F. Audrieth, Department of Chemistry; *Phosphorus-Nitrogen Compounds and Their Derivatives;* 3 years; $16,200.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Elias J. Corey, Department of Chemistry; *Total Synthesis of Pentacyclic Triterpenes;* 2 years; $17,600.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Carl S. Marvel, Department of Chemistry; *Synthesis and Relation Between Structure and Properties of High Polymers;* 2 years; $62,800.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Frederick T. Wall, Department of Chemistry; *Mechanics of Coiling Type Polymer Molecules;* 2 years; $34,700.

INDIANA UNIVERSITY, Bloomington, Ind.; Harry G. Day, Department of Chemistry; *Kinetic Studies by Mass Spectrometry;* 1 year; $8,900.

INDIANA UNIVERSITY, Bloomington, Ind.; Frank T. Gucker, Department of Chemistry; *Light Scattering by Aerosols and Gases;* 3 years; $37,900.

INDIANA UNIVERSITY, Bloomington, Ind.; Walter J. Moore, Department of Chemistry; *Chemical Reactions of Ionic Beams;* 2 years; $30,300.

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Ralph L. Shriner; Department of Chemistry; *Spectrophotometric Studies of Reactions and Properties of Selected Organic Compounds;* 1 year; $7,300.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Paul H. Emmett, Department of Chemistry; *Role of Ions in Catalytic Hydrogenations;* 2 years; $20,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; John W. Gryder, Department of Chemistry; *Chemistry of the Condensed Phosphates;* 3 years; $21,300.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Alex Mickon, Department of Chemistry; *Photosensitized Oxidation of Olefins;* 3 years; $19,200.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Dean W. Robinson, Department of Chemistry; *Far Infrared Spectra of Disiloxane and Derivatives;* 3 years; $15,800.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Emil H. White, Department of Chemistry; *Deamination of Aliphatic Amines;* 2 years; $13,100.

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE, Manhattan, Kans.; Thomas D. O'Brien, Department of Chemistry; *Spectrophotometric Studies in Organic Chemistry;* 1 year; $5,600.

KANSAS STATE COLLEGE, Manhattan, Kans.; Scott Searles, Jr., Department of Chemistry; *Oxetanes and Oxetenes;* 2 years; $14,300.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Arthur W. Davidson, Department of Chemistry; *Analytical, Inorganic, Organic, and Physical Chemistry;* 3 months; $5,900.

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Lyle R. Dawson, Department of Chemistry, University of Kentucky; *X-ray Structure of Organic Molecular Crystals and Rare Earth Salts;* 2 years; $9,000.

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Paul G. Sears, Department of Chemistry; *Conductances of Multivalent Electrolytes;* 1 year; $5,200.

LONG BEACH STATE COLLEGE, Long Beach, Calif.; Robert B. Henderson, Department of Chemistry; *Organic Chemistry;* 3 months; $6,000.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Hulen B. Williams, Department of Chemistry; *X-ray Absorption, Diffraction, and Fluorescence;* 2 years; $6,000.

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; R. H. Wiley, Department of Chemistry; *Ultraviolet Absorption and Other Spectrophotometric Studies;* 2 years; $8,000.

LUTHER COLLEGE, Luther, Iowa; George E. Knudson, Department of Chemistry; *Reactions of Dithionite With Metal Ions;* 2 years; $4,600.

UNIVERSITY OF MARYLAND, College Park, Md.; George M. Brown, Department of Chemistry; *X-ray Analysis of Organic Crystal Structures;* 3 years; $27,300.

UNIVERSITY OF MARYLAND, College Park, Md.; Ellis R. Lippincott, Department of Chemistry; *Spectroscopic Study of Inorganic Salts in Non-Aqueous Inorganic Solvents;* 3 years; $21,400.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Equipment Grant for High Polymer Research.*

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; F. Albert Cotton, Department of Chemistry; *Kinetic and Spectral Studies of Complex Ions;* 2 years; $8,400.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Avery A. Morton; *Polymerization and Polymers Produced by Organoalkala Metal Reagents;* 1 year; $57,600.

MELLON INSTITUTE OF INDUSTRIAL RESEARCH, Pittsburgh, Pa.; *Equipment Grant for High Polymer Research.*

MELLON INSTITUTE OF INDUSTRIAL RESEARCH, Pittsburgh, Pa.; Hershel Markovitz; *Physical Properties and Molecular Parameters of Polymers;* 1 year; $43,500.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; J. L. Dye, C. H. Brubaker and R. Birdwhistell, Department of Chemistry; *Properties of High-Charge Type Electrolytes in Aqueous Solution;* 2 years; $24,000.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Harold Hart, Department of Chemistry; *Abstraction of Hydrogens From Alicyclic Compounds;* 2 years; $10,100.

MILLIKIN UNIVERSITY, Decatur, Ill.; Carl Weatherbee, Department of Chemistry; *Mannich Type Condensations;* 2 years; $4,900.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; *Equipment Grant for High Polymer Research.*

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; I. M. Kolthoff, Department of Chemistry; *Kinetics and Mechanism of Emulsion Polymerization;* 1 year; $59,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; I. M. Kolthoff, Department of Chemistry; *Polarography at the Rotated Dropping Mercury Electrode;* 2 years; $18,200.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; William N. Lipscomb, Department of Chemistry; *X-ray Structure Studies at Helium Temperatures;* 3 years; $52,500.

UNIVERSITY OF MISSISSIPPI, University, Miss.; Lewis Nobles, Department of Chemistry; *The Mannich Reaction;* 3 years; $6,900.

MOUNT HOLYOKE COLLEGE, South Hadley, Mass.; Lucy W. Pickett, Department of Chemistry; *Research in Organic Reactions by Infrared Spectroscopy;* 2 years; $7,000.

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; Herbert Leaderman and George T. Furukawa; *Rheology and Thermodynamics of Polymers;* 1 year; $37,700.

UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; Henry E. Baumgarten, Department of Chemistry; *Reactions of Amines;* 2 years; $13,800.

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; Harold A. Iddles, Department of Chemistry; *Visible and Ultraviolet Spectrophoto-Chemical Studies;* 1 year; $7,500.

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; E. Gerald Meyer, Department of Chemistry; *Research on N-Heterocyclic Compounds and Inorganic Complex Ions;* 1 year; $6,000.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; J. I. Riebsomer, Department of Chemistry; *Synthesis of Polycyclic, Heterocyclic and Asymmetric Compounds;* 1 year; $3,800.

NEWARK COLLEGE OF ENGINEERING, Newark, N. J.; James A. Bradley, Department of Chemistry; *Sulfonation of Aromatic Compounds With Halides of Non-Metals;* 3 months; $2,000.

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Michael Szwarc, Department of Chemistry, College of Forestry, Syracuse, N. Y.; *Polymerizations Initiated by Electron-Transfer to Monomer;* 2 years; $30,800.

NEW YORK UNIVERSITY, New York, N. Y.; John E. Vance, Department of Chemistry; *Infrared Spectrophotometry in Organic Chemistry;* 2 years; $7,000.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Arthur Roe, Department of Chemistry; *Broad Range Spectrophotometric Investigation in Physical Chemistry;* 2 years; $8,000.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; G. F. D'Alelio, Department of Chemistry; *Vapor Phase Chromatography;* 2 years; $1,000.

NORTHEASTERN UNIVERSITY, Boston, Mass.; Arthur A. Vernon, Department of Chemistry; *Research in Reaction Mechanisms by Infrared Spectroscopy;* 2 years; $7,000.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; A. S. Hussey and R. L. Burwell, Department of Chemistry; *Summer Research for Chemistry Teachers;* 3 months; $4,100.

OHIO STATE UNIVERSITY, Columbus, Ohio; Daryle H. Busch, Department of Chemistry; *Thermodynamics and Electron Transfers of Complex Inorganic Optical Isomers;* 2 years; $13,900.

OHIO STATE UNIVERSITY, Columbus, Ohio; William MacNevin, Department of Chemistry; *Platinum Group Metal Versenates;* 3 years; $15,500.

OHIO STATE UNIVERSITY, Columbus, Ohio; Melvin S. Newman, Department of Chemistry; *Non-Planar-Aromatic Polycyclic Hydrocarbons;* 3 years; $30,000.

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Thomas S. Oey, Department of Chemistry; *Phase Study: Quaternary Salt System;* 2 years; $5,300.

OHIO UNIVERSITY, Athens, Ohio; Lawrence P. Eblin, Department of Chemistry; *Infrared Absorption Studies on Simple Molecules;* 2 years; $7,000.

UNIVERSITY OF OKLAHOMA, Norman, Okla.; Bernard O. Heston, Department of Chemistry; *Infrared Spectrophotometric Applications in Organic Synthesis;* 1 year; $3,800.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; J. G. Aston and J. J. Fritz, Department of Chemistry; *Low Temperature Research in Chemistry;* 2 years; $30,000.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; A. Witt Hutchison, Department of Chemistry; *Ultraviolet Spectrophotometric Research;* 2 years; $8,000.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Henry S. Frank, Department of Chemistry; *Infrared Studies in Physical Chemistry;* 2 years; $7,000.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Henry S. Frank and T. H. Dunkelberger, Department of Chemistry; *Relation of Structure to Properties in Liquid Solutions;* 3 years; $35,000.

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; H. P. Gregor, Department of Chemistry; *Ion Selective and Ion Specific Membranes;* 2 years; $21,700.

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; R. A. Marcus, Department of Chemistry; *Theoretical Study of Electron Transfer Systems;* 2 years; $18,300.

POMONA COLLEGE, Claremont, Calif.; Corwin Hansch, Department of Chemistry; *The Dehydrocyclization Reaction;* 2 years; $11,300.

POMONA COLLEGE, Claremont, Calif.; Corwin Hansch, Department of Chemistry; *Organic and Physical Chemistry;* 3 months; $6,000.

PRINCETON UNIVERSITY, Princeton, N. J.; Robert N. Pease, Department of Chemistry; *Application of Nuclear Magnetic Resonance Spectroscopy to Catalysis and Organic Syntheses;* 2 years; $10,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind., W. W. Brandt, Department of Chemistry; *Spectrofluorimetric Analysis With Monochromatic Excitation;* 3 years; $17,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; William E. Truce, Department of Chemistry; *Electronic and Steric Effects of the Sulfonyl Group in Organic Compounds;* 2 years; $10,200.

PURDUE UNIVERSITY, Lafayette, Ind.; Herbert C. Brown, Department of Chemistry; *Chemical Effects of Steric Strains;* 2 years; $23,000.

REED COLLEGE, Portland, Oreg.; Arthur F. Scott, Department of Chemistry; *Chemical Determination of Atomic Weights;* 5 years; $17,400.

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; Sydney Ross, Department of Chemistry; *Adsorption of Vapors on Solids;* 2 years; $13,400.

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Conrad Schuerch, Department of Chemistry, College of Forestry, Syracuse, N. Y.; *Stereoisomerism of Vinyl Polymers;* 2 years; $11,800.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; V. Boekelheide, Department of Chemistry; *Amine Oxides;* 3 years; $19,700.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Frank P. Buff, Department of Chemistry; *Molecular Theory of Fluids;* 3 years; $19,000.

ST. LAWRENCE UNIVERSITY, Canton, N. Y.; Paul E. Merritt, Department of Chemistry; *Infrared Adsorption Studies on Pyrroles Polypeptides and Cis-Trans Isomerism;* 1 year; $1,700.

SAINT JOSEPH COLLEGE, Emmitsburg, Md.; Louis W. Clark Department of Chemistry; *Thermal Decomposition of Organic Acids;* 2 years; $9,300.

ST. EDWARD'S UNIVERSITY, Austin, Tex.; Raymond Fleck, Department of Chemistry; *Stereochemistry of Addition of Halogen to Substituted Maleate Ion;* 2 years; $3,000.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Karol J. Mysels, Department of Chemistry; *Electrodiffusion Method for Rapid Ionic Reactions;* 3 years; $21,000.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; James C. Warf, Department of Chemistry; *Perbromates and Arsenic (V) Chloride;* 1 year; $4,200.

UNIVERSITY OF SOUTH CAROLINA, Columbia, S. C.; H. W. Davis, Department of Chemistry; *Solution Chemistry and Kinetics of Organic Reactions;* 3 months; $4,600.

UNIVERSITY OF SOUTH CAROLINA, Columbia, S. C.; H. W. Davis, Department of Chemistry; *Reactivities of Free Radicals in Solution;* 2 years; $1,000.

UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; Charles R. Estee, Department of Chemistry; *Perkin-Elmer, Model 12-C Single Beam Infrared Spectrophotometer for Basic Research.*

STANFORD UNIVERSITY, Stanford, Calif.; William A. Bonner, Department of Chemistry; *Influence of Substituents on Rates of Equilibration of 1, 2, 2-Triaryethyl Carbonium Ions;* 3 years; $19,000.

STANFORD UNIVERSITY, Stanford, Calif.; Harry S. Mosher, Department of Chemistry and Chemical Engineering; *Mechanism of Decomposition of Primary Hydroperoxides and Related Peroxides;* 2 years; $17,100.

STANFORD UNIVERSITY, Stanford, Calif.; George S. Parks, Department of Chemistry and Chemical Engineering; *Broad Range Spectrophotometric Studies in Inorganic and Organic Chemistry;* 2 years, $8,000.

SYRACUSE UNIVERSITY, Syracuse, N. Y.; Thomas H. Walnut, Department of Chemistry; *Structure of Infrared Bands of Molecular Crystals;* 2 years; $21,300.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; C. A. Buehler, Department of Chemistry; *Kinetic and Equilibrium Studies by Use of Ultraviolet Spectroscopy;* 2 years; $8,000.

UNIVERSITY OF TEXAS, Austin, Tex.; Philip S. Bailey, Department of Chemistry; *Mechanism of the Ozonolysis Reaction;* 2 years; $15,000.

TUFTS UNIVERSITY, Medford, Mass.; M. Kent Wilson, Department of Chemistry; *High Resolution Spectra of Isotopically Pure Compounds;* 3 years; $48,400.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Robert E. Lutz, Department of Chemistry; *Stereochemistry and Effectiveness of Conjugation in Chalcones and Related Systems;* 3 years; $20,300.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Paul N. Schatz, Department of Chemistry; *Absolute Infrared Intensity Studies;* 3 years; $17,700.

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WAYNE STATE UNIVERSITY, Detroit, Mich.; George H. Coleman, Department of Chemistry; *Nuclear Magnetic Resonance Spectra in Structure Determination;* 2 years; $15,000.

WAYNE STATE UNIVERSITY, Detroit, Mich.; Carl Djerassi, Department of Chemistry; *Structure Determination of a Naturally Occurring Insecticide;* 2 years; $15,000.

WAYNE STATE UNIVERSITY, Detroit, Mich.; Calvin L. Stevens, Department of Chemistry; *Analytical, Inorganic, Organic, ad Physical Chemistry;* 3 months; $6,900.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Arthur C. Wahl, Department of Chemistry; *Kinetics of Oxidation-Reduction Reactions;* 2 years; $6,900.

WASHINGTON UNIVERSITY, St. Louis, Mo.; S. I. Weissman, Department of Chemistry; *Studies at Low Temperatures;* 1 year; $21,000.

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; Grant G. Smith, Department of Chemistry; *Rearrangement of Alpha-Kiketones and Ester Hydrolysis;* 2 years; $8,500.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Paul C. Cross, Department of Chemistry; *Nuclear Magnetic Resonance Applications in Organic Chemistry Research;* 2 years; $15,000.

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; James B. Hickman, Department of Chemistry; *Binary Liquid Mixtures of Non-Electrolytes;* 2 years; $8,500.

UNIVERSITY OF WISCONSIN, Madison, Wis.; C. F. Curtiss, Department of Chemistry; *Extension of Kinetic Theory of Gases;* 3 years; $22,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; John D. Ferry, Department of Chemistry; *Mechanical Properties and Polymer Structure;* 3 years; $35,900.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Daniel L. Leussing, Department of Chemistry; *Reactions of Sulfhydryl Compounds with Metal Ions;* 2 years; $8,100.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Eugene E. Van Tamelen, Department of Chemistry; *Structure and Syntheses of Alkaloids;* 3 years; $20,000.

UNIVERSITY OF WYOMING, Laramie, Wyo.; E. R. Schierz, Department of Chemistry; *Investigation of Selected Reaction Mechanisms and the Constitution of Natural Products by Infrared Spectroscopy;* 2 years; $7,000.

YALE UNIVERSITY, New Haven, Conn.; Benton B. Owen, Department of Chemistry; *Dielectric Constant of Water at High Pressures;* 1 year; $2,700.

Developmental Biology

ALBION COLLEGE, Albion, Mich.; William J. Gilbert, Department of Biology; *Morphogenesis in the Bryophyta;* 1 year; $1,700.

UNIVERSITY OF BRITISH COLUMBIA, Vancouver, Canada; John Sanjean, Department of Zoology; *Identity of Neurons in Thoracic Ganglia of Periplaneta Americana* (L.); 1 year; $5,000.

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; John V. Slater, Department of Biology; *Nucleo-Cytoplasmic Interactions During Intracellular Differentiation;* 2 years; $8,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Anton Lang, Department of Botany, Los Angeles, Calif.; *Role of Gibberellin in Cell Division and Morphogenesis in Plants;* 2 years; $13,200.

CARLETON COLLEGE, Northfield, Minn.; Thurlo B. Thomas, Department of Biology; *The Developing Lacrimal Gland of the Rat;* 1 year; $1,900.

COLUMBIA UNIVERSITY, New York, N. Y.; L. C. Dunn and Dorothea Bennett, Department of Zoology; *Analysis in Vitro of the Developmental Effects of Genetic Factors at the T-Locus in the Mouse;* 2 years; $13,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; Perry W. Gilbert, Department of Zoology; *Morphology and Physiology of the Reproductive Tract in Elasmobranch Fishes;* 2 years; $6,800.

HARVARD UNIVERSITY, Cambridge, Mass.; L. R. Cleveland, Biological Laboratories; *Sexuality of Protozoa of Cryptocercus and Termites;* 2 years; $19,500.

HARVARD UNIVERSITY, Cambridge, Mass.; John R. Raper and George Bistis, Department of Biology; *Cellular Differentiation in Ascobolus;* 2 years; $14,600.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; W. T. Dempster, Department of Anatomy; *Architecture and Structural Properties of Human Long Bones;* 3 years; $22,500.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Norman E. Kemp, Department of Zoology; *Synthesis and Utilization of Yolk During Oogenesis and Embryonic Development;* 2 years; $12,200.

NEW YORK UNIVERSITY, New York, N. Y.; William J. Crotty, Department of Biology, Washington Square College; *Control by Visible Radiation of Development in Ferns;* 2 years; $9,300.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Ralph O. Erickson, Department of Botany; *Cell Division and Cell Growth in Higher Plants;* 3 years; $25,700.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Ian M. Sussex, Department of Biological Sciences; *Morphogenesis in the Shoot of Vascular Plants;* 2 years; $13,000.

PRINCETON UNIVERSITY, Princeton, N. J.; John T. Bonner, Department of Biology; *Differentiation in the Cellular Slime Molds;* 3 years; $17,000.

PRINCETON UNIVERSITY, Princeton, N. J.; William P. Jacobs, Department of Biology; *Factors Controlling Cell Differentiation in Plants;* 2 years; $12,650.

REED COLLEGE, Portland, Oreg.; M. T. M. Rizki, Department of Biology; *Cytophysiology of Metamorphosis in Drosophila;* 1 year; $6,300.

REED COLLEGE, Portland, Oreg.; M. T. M. Rizki, Department of Biology; *Cytophysiology of Metamorphosis in Drosophila;* 1 year; $700.

RICE INSTITUTE, Houston, Tex.; Roy V. Talmage and Allen C. Enders, Department of Biology; *Phenomena of Implantation Delay in Armadillo Blastocyst;* 3 years; $24,600.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, New York, N. Y.; Armin C. Braun; *Chemical Nature and Mode of Action of a Specific Inducer of the Male Sex Organ in Plant Species;* 2 years; $16,000.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Ronald C. Fraser, Department of Zoology; *Somite Formation in the Early Chick Embryo;* 2 years; $11,500.

TEXAS AGRICULTURAL EXPERIMENT STATION, College Station, Tex.; James N. Weaver, Department of Entomology; *Nutritional Factors in the Differentiation of the Honeybee;* 2 years; $8,500

TEXAS SOUTHERN UNIVERSITY, Houston, Tex.; Alberta J. Seaton, Department of Biology; *Cytological Organization of the Egg of Placental Mammals Using Histochemical Tests;* 1 year; $3,000.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; J. David Deck, Department of Anatomy; *Quantity of Nerves Necessary for Regeneration of Forelimbs of a Larval Amphibian;* 2 years; $8,200.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Morris S. McKeehan, School of Medicine; *Growth and Differentiation of the Lens Primordium;* 3 years; $6,300.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Viktor Hamburger and Rita Levi-Montalcini, Department of Zoology; *Analysis of Nerve Growth-Promoting Agents;* 1 year; $26,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; H. W. Mossman, Department of Anatomy; *Comparative Morphology and Physiology of the Uterine Vascular System;* 2 years; $13,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Kenneth B. Raper, Department of Bacteriology; *Comparative Morphogenesis in Simple Slime Molds;* 3 years; $23,500.

WITTENBERG COLLEGE, Springfield, Ohio; Knut J. Norstog, Department of Biology; *Embryogenesis in the Grasses;* 3 years; $4,500.

YALE UNIVERSITY, New Haven, Conn.; William T. Jackson, Department of Botany; *Root-Hair Initiation and Development;* 1 year; $3,000.

YALE UNIVERSITY, New Haven, Conn.; J. S. Nicholas, Department of Zoology; *Experimental Analysis of Rat Development;* 2 years; $12,300.

YALE UNIVERSITY, New Haven, Conn.; Donald F. Poulson, Department of Zoology; *Physiological and Developmental Genetic Studies on Drosophila;* 2 years; $18,800.

Earth Sciences

ROY A. BAILEY, Silver Spring, Md.; *Welded Tuffs of New Zealand;* 6 Months; $800.

DAVID ST. CLAIR, Durham, Conn.; *Manganese Deposits of Oriente Province, Cuba;* 1 year; $1,250.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Daniel I. Axelrod, Department of Geology, Los Angeles, Calif.; *Tertiary Floras of Nevada;* 3 years; $15,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; C. A. Nelson, Department of Geology, Los Angeles, Calif.; *Geology of Waucoba Mountain Quadrangle;* 1 year, $4,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Jerzy Neyman, Department of Statistics; *Randomized Cloud Seeding;* 3 years; $36,700.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; F. J. Turner, Department of Geological Sciences; *Fabric of Experimentally Deformed Rocks;* 2 years; $12,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; A. E. J. Engel and A. A. Chodos, Division of Geological Sciences; *Metamorphic Processes;* 3 years; $25,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; G. J. Wasserburg, Division of Geological Science; *$Argon^{40}$-$Potassium^{40}$ Dating;* 2 years; $19,800.

CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Sharat K. Roy, Curator of Geology; *Chondrules in Stony Meteorites;* 1 year; $4,350.

UNIVERSITY OF CHICAGO, Chicago, Ill.; A. J. Frueh, Jr., Department of Geology; *Crystal Chemistry of Sulfide Minerals;* 2 years; $11,500.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; L. H. Larsen, Department of Geology and Geography; *Zircon Distribution in Granites;* 1 year; $2,250.

COLBY COLLEGE, Waterville, Maine; P. H. Osberg, Department of Geology; *Recumbent Folds in Vermont;* 1 year; $600.

COLUMBIA UNIVERSITY, New York, N. Y.; Maurice Ewing, Lamont Geological Observatory; *Reduction of Magnetic Data;* 3 years; $17,300.

COLUMBIA UNIVERSITY, New York, N. Y.; Maurice Ewing, Director, Lamont Geological Observatory; *Earthquake Surface Waves;* 3 years; $31,000.

COLUMBIA UNIVERSITY, New York, N. Y.; J. L. Kulp and P. W. Gast, Lamont Geological Observatory; *Isotope Geology of Strontium and Rubidium;* 2 years; $19,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Arie Poldervaart, Department of Geology; *Structure and Petrogenesis of Beartooth Mountains;* 2 years; $17,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; E. P. Wheeler 2d, Department of Geology; *Anorthosites of Northern Labrador;* 3 years; $6,900.

EARLHAM COLLEGE, Richmond, Ind.; Ansel N. Gooding, Department of Geology, and Murvel R. Garner, Department of Biology; *Pleistocene Geology of Whitewater Basin;* 3 years; $26,500.

INDIANA UNIVERSITY, Bloomington, Ind.; C. J. Vitaliano, Department of Geology; *Volcanic Rocks of Western Nevada;* 3 years; $17,600.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; R. B. Montgomery, Chesapeake Bay Institute; *Analysis of Serial Oceanographic Observations;* 3 years; $20,900.

UNIVERSITY OF KANSAS, Lawrence, Kans.; A. Byron Leonard, Department of Zoology; *Cenozoic Mollusca;* 2 years; $10,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; M. J. Buerger, Department of Geology and Geophysics; *Crystal Structures in Minerals;* 2 years; $17,500.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; R. R. Doell, Department of Geology and Geophysics; *Magnetism in Sedimentary Rocks;* 3 years; $16,600.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; H. W. Fairbairn and G. J. F. MacDonald, Department of Geology and Geophysics; *Equilibrium Nature of Metamorphic Processes;* 3 years; $30,500.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; F. F. Koczy, The Marine Laboratory; *Distribution of Radioactive Elements in Oceans;* 1 year; $10,000.

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; R. G. Stephenson, Executive Director; *Operation of the American Geological Institute;* 1 year; $20,000.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; A. J. MacAlpin, Department of Geology; *Pleistocene Geology of Cheboygan and Emmet Counties, Michigan;* 2 years; $3,400.

OBERLIN COLLEGE, Oberlin, Ohio; Kathryn H. Clisby, Department of Geology and Geography; *Pollen Studies and Pleistocene Chronology of San Augustin Plains;* 1 year; $9,150.

OBERLIN COLLEGE, Oberlin, Ohio; Fred Foreman, Department of Geology and Geography; *Sedimentary Petrology of San Augustin Plains;* 1 year; $2,500.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Kaolin Clays of Southeastern United States;* 3 years; $21,000.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; C. W. Burnham, Department of Geology; *Trace Elements in Sulfide Ores;* 2 years; $18,650.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Charles L. Hosler, *Aggregation of Ice Crystals;* 3 years; $11,000.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; M. L. Keith, Department of Geophysics and Geochemistry; *Fractionation of Stable Isotopes;* 2 years; $14,500.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Exsolution in Pyroxenes;* 1 year; $2,500.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Elizabeth K. Ralph, Department of Physics; *Half Life of Carbon 14;* 2 years; $20,000.

PRINCETON UNIVERSITY, Princeton, N. J.; H. D. Holland, Department of Geology; *Age Determination by Radiation Damage;* 1 year; $9,500.

PRINCETON UNIVERSITY, Princeton, N. J.; *Geologic Investigations of Paleolithic Man;* 2 years; $14,500.

PRINCETON UNIVERSITY, Princeton, N. J.; J. C. Maxwell, Department of Geological Engineering; *Tectonics of Philipsburg-Drummond Area;* 3 years; $15,400.

ROYAL ACADEMY OF SCIENCES, Stockholm, Sweden; B. Hultqvist, Director; *Research at the Kiruna Geophysical Observatory;* 1 year; $25,000.

RUTGERS UNIVERSITY, New Brunswick, N. J.; Peter E. Wolfe, Department of Geology; *Post-Miocene Arching of Middle Rocky Mountains;* 2 years; $10,100.

ST. LOUIS UNIVERSITY, St. Louis, Mo.; V. T. Allen, Department of Geology; *Bauxite Deposits of the United States and Europe;* 2 years; $3,000.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; K. O. Emery and Allan Hancock, Allan Hancock Foundation for Scientific Research; *Rate of Deposition of Sediments Off Southern California;* 18 months; $20,000.

UNIVERSITY OF UTAH, Salt Lake City, Utah; Kenneth L. Cook and Joseph W. Berg, Jr., Department of Geophysics; *Gravity, Seismic, and Magnetic Studies in Utah and Eastern Nevada;* 2 years; $23,000.

UNIVERSITY OF UTAH, Salt Lake City, Utah; L. B. Sand, Department of Mineralogy; *Phase Equilibria Relationships in the System Lime-Alumina-Silica-Water;* 2 years; $17,700.

WASHINGTON UNIVERSITY, St. Louis, Mo.; W. D. Johns, Department of Geology and Geological Engineering; *Argillaceous Marine Sediments from Arctic and Sub-Arctic Regions;* 2 years; $13,000.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; R. G. Fleagle, Department of Meteorology and Climatology; *Physics of Atmospheric Motions;* 2 years; $12,400.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; A. E. Harrison, Department of Electrical Engineering; *Photogrammetric Surveys of Coleman Glacier;* 5 years; $6,000.

WAYNE STATE UNIVERSITY, Detroit, Mich.; Willard H. Parsons, Department of Geology; *Volcanic Rocks in Northern Absaroka Region;* 2 years; $12,200.

UNIVERSITY OF WICHITA, Wichita, Kans.; Paul Tasch, Department of Geology; *Permian Conchostracans of Kansas and Oklahoma;* 2 years; $5,600.

UNIVERSITY OF WICHITA, Wichita, Kans.; Paul Tasch, Department of Geology; *Fauna and Paleoecology of Maquoketa Shale of Iowa;* 1 year; $1,000.

WILSON COLLEGE, Chambersburg, Pa.; Jean Hough, Department of Biology; *Oligocene Mammals of North Dakota;* 1 year; $2,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; G. P. Wollard, Department of Geology; *Crustal Structure on Selected Geologic Provinces;* 2 years; $46,000.

YALE UNIVERSITY, New Haven, Conn.; Alan M. Bateman and M. L. Jensen, Department of Geology; 3 years; $20,000.

Engineering Sciences

BROWN UNIVERSITY, Providence, R. I.; Paul S. Symonds, Department of Engineering; *Structures Under Dynamic Loading;* 1 year; $9,000.

BUCKNELL UNIVERSITY, Lewisburg, Pa.; Octave Levenspiel, Department of Chemical Engineering; *Vapor Collapse in Liquids;* 2 years; $7,100.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Donald Coles and C. B. Millikan, Department of Aeronautics; *Stability of Fluid Flow;* 2 years; $19,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Cyril P. Atkinson, Department of Engineering; *Solution of Differential Equations of Nonlinear Mechanics by Application of Electronic Differential Analyzer;* 3 years; $18,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; H. A. Einstein and J. W. Johnson, Department of Engineering; *Transport of Silty Sediments in an Alluvial Stream;* 3 years; $16,400.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; H. A. Schade, Department of Engineering, Institute of Engineering Research; *Reproductions of Recorded Ocean Waves;* 1 year; $10,800.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; O. J. M. Smith, Department of Engineering; *A Complex-Zero Signal Generator;* 1 year; $3,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; E. G. Thomsen, Division of Engineering; *Plastic Flow of Metals in Forming Processes;* 2 years; $17,600.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert A. Mathias, Department of Electrical Engineering; *Static Digital Control Systems;* 2 years; $11,000.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Fletcher Osterle, Department of Mechanical Engineering; *Fluid Film Lubrication;* 2 years; $12,700.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; H. L. Toor, Department of Chemical Engineering; *Transfer of Matter Across Gas-Liquid Interfaces;* 2 years; $12,000.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; E. M. Williams, Department of Electrical Engineering; *Transient Low-Voltage Sparkover in Liquid Dielectrics;* 2 years; $12,600.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio.; Robert Lemlich, Department of Chemical Engineering; *Effect of Vibration on Convection Heat Transfer;* 3 years; $7,200.

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; R. H. Price, Department of Chemical and Metallurgical Engineering; *Axial Mixing of Fluids Flowing Through Beds of Solid Particles;* 2 years; $1,100.

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; Maurice L. Albertson, Department of Civil Engineering; *Equilibrium Conditions in Open Channels;* 1 year; $2,300.

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; H. K. Liu, Department of Civil Engineering; *Analytical Study of Alluvial Channel Roughness;* 1 year; $7,200.

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; D. F. Peterson, Jr., Department of Civil Engineering; *Open Channel Research;* 1 year; $10,000.

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; D. F. Peterson, Department of Civil Engineering; *Hydraulics of Meanders and Spur Dikes;* 1 year, $6,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Robert B. Gordon, Department of Mining, Metallurgical and Mineral Engineering; *Plasticity of Ionic Crystals;* 2 years; $16,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Richard Skalak, Department of Civil Engineering and Engineering Mechanics; *Bubbles in a Vibrating Liquid;* 2 years; $20,400.

COLUMBIA UNIVERSITY, New York, N. Y.; L. A. Zadeh, Department of Electrical Engineering; *Theory of Sequential Machines and Automata;* 3 years; $22,300.

UNIVERSITY OF DETROIT, Detroit, Mich.; Leon S. Kowalczyk, Department of Chemical Engineering; *Thermal Conductivity of Organic Compounds at Their Melting Points;* 2 years; $8,000.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; T. M. Reed, Department of Chemical Engineering; *Viscosity of Liquid Mixtures Containing a Fluorocarbon as One Component;* 2 years; $13,900.

GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; Kenneth G. Picha, Department of Mechanical Engineering; *Nocturnal Radiation;* 1 year; $4,500.

HARVARD UNIVERSITY, Cambridge, Mass.; A. R. Lang, Division of Engineering and Applied Physics; *Imperfections in Crystals Grown From the Melt;* 2 years; $20,900.

HOWARD UNIVERSITY, Washington, D. C.; Walter T. Daniels, Department of Civil Engineering; *Impact Studies on Post-Tensioned Prestressed Concrete Beams;* 2 years; $12,000.

UNIVERSITY OF HOUSTON, Houston, Tex.; Chen-Jung Huang, Department of Chemical Engineering; *Mass Transfer Accompanied by Chemical Reaction;* 18 months; $7,500.

UNIVERSITY OF HOUSTON, Houston, Tex.; H. W. Prengle, Department of Chemical Engineering; *Thermodynamics of Solutions;* 1 year; $15,700.

UNIVERSITY OF HOUSTON, Houston, Tex.; H. W. Prengle, Department of Chemical Engineering; *Vapor-Liquid Equilibria of Extractive Distillation Systems;* 3 years; $17,800.

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Robert C. Kintner, Department of Chemical Engineering; *Motions of Moving Bubbles and Drops;* 3 years; $22,000.

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; L. F. Mondolfo, Department of Metallurgical Engineering; *Nucleation in Liquid Metals;* 3 years; $18,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; C. E. Bowman and C. E. Kesler, Department of Theoretical and Applied Mechanics; *Research on Engineering Materials;* 1 year; $7,600.

UNIVERSITY OF ILLINOIS, Urbana Ill.; Arthur L. Friedberg, Department of Ceramic Engineering; *Study of Nucleation Phenomena and Opacification in Titania-Opacified Porcelain Enamels;* 2 years; $13,700.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Clyde E. Kesler, Department of Theoretical and Applied Mechanics; *Fatigue of Concrete;* 1 year; $7,900.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; M. F. Peters, Department of Chemical Engineering; *Kinetics and Mechanisms of Intermediate and Side Reactions;* 2 years; $16,500.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; J. W. Westwater, Department of Chemical Engineering; *Microscopic Examination of Nucleation in Boiling Liquids;* 3 years; $18,900.

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Karl Kammermeyer and James O. Osburn, Department of Chemical Engineering; *Separation Effect in Flowing Fluids;* 2 years; $17,500.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Jerome Gavis, Department of Chemical Engineering; *Tensile Stress in Jets of Viscoelastic Fluids;* 2 years; $11,400.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; James M. McKelvey, Department of Chemical Engineering; *Heat Transfer in Dropwise Condensation;* 2 years; $7,800.

LAMAR RESEARCH CENTER, Beaumont, Tex.; J. F. Woodham, Chemical Engineering Department, Lamar State College of Technology; *Chemical Reaction in Fractionation Equipment;* 30 months; $9,400.

LAMAR RESEARCH CENTER, Beaumont, Tex.; H. H. Yang, Department of Chemical Engineering, Lamar State College of Technology; *Two-Phase Fluid Flow;* 1 year; $10,000.

LEHIGH UNIVERSITY, Bethlehem, Pa.; Frank Kreith, Department of Mechanical Engineering; *Influence of Centrifugal Forces on Heat Transfer and Flow;* 2 years; $11,500.

LEHIGH UNIVERSITY, Bethlehem, Pa.; Bruno Thurlimann, Department of Civil Engineering; *Influence Surfaces for Bending Moments in Slabs;* 2 years; $15,100.

LEHIGH UNIVERSITY, Bethlehem, Pa.; L. A. Wenzel, Department of Chemical Engineering; *Catalytic Hydration;* 1 year; $3,100.

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; S. C. Spalding, Jr., Department of Chemical Engineering; *Fluidized Bed Derivatives;* 1 year; $10,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Morris Halle, Research Laboratory of Electronics; *Problems of Linguistic Structure;* 2 years; $21,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Tau-Yi Toong, Department of Mechanical Engineering; *Ignition and Flame Stabilization in a Boundary Layer Over a Hot Flame;* 2 years; $25,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; John G. Trump, Department of Electrical Engineering; *High Voltage Discharges;* 2 years; $27,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; H. H. Uhlig, Department of Metallurgy; *Origin of Meteorites;* 3 years; $22,400.

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Kenneth D. Cashin, Chemical Engineering Department; *Relationship Between Heat Transfer and Quality of Fluidization in Gas-Solid Fluidized System;* 2 years; $6,100.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Herman E. Koenig, Department of Electrical Engineering; *Dynamic Network Theory;* 2 years; $12,900.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; T. H. Wu, Department of Civil Engineering; *Porewater Pressure Changes in Clays Under Shear Stress;* 2 years; $17,500.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Donald L. Katz, Department of Chemical and Metallurgical Engineering; *Thermodynamic Properties of the Light Hydrocarbons at High Pressure and Low Temperature;* 2 years; $16,800.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Gordon E. Peterson, Speech Research Laboratory; *Research Instrumentation for an Electrostatic Sound Spectrograph;* 2 years; $25,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Gunnar Hok, Department of Electrical Engineering and D. R. Mason, Department of Chemical and Metallurgical Engineering; *Relaxation and Resonance Phenomena in Magnetic and Dielectric Ceramics;* 1 year; $25,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; E. R. G. Eckert, Department of Mechanical Engineering; *Heat Transfer Research;* 1 year; $25,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Herbert S. Isbin, Department of Chemical Engineering; *Studies Using Gamma Irradiation;* 1 year; $17,500.

UNIVERSITY OF MINNESOTA, Mineapolis, Minn.; R. C. Jordan, Department of Mechanical Engineering; *Heat Transfer;* 1 year; $3,450.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Gordon J. Murphy, Department of Electrical Engineering; *Synthesis of Sampled-Data Control Systems;* 2 years; $19,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; J. L. Threlkeld and R. C. Jordan, Department of Mechanical Engineering; *Collection of Solar Radiation on Plane Surfaces;* 2 years; $13,800.

UNIVERSITY OF MISSISSIPPI, University, Miss.; Frank A. Anderson, Department of Chemical Engineering; *Binary Mixture Viscosities;* 1 year; $4,100.

UNIVERSITY OF MISSOURI, Columbia, Mo.; George B. Clark, Department of Mining Engineering, School of Mines and Metallurgy, Rolla, Mo.; *Strain Rates in Rock Under Transient Loads;* 3 years; $33,300.

MONTANA STATE COLLEGE, Bozeman, Mont.; Robert C. Seibel and Donald K. Weaver, Jr., Department of Electrical Engineering; *Meteor Burst Phenomena;* 1 year; $5,800.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; K. Moore, Electrical Engineering Division; *Use of Distributed Amplifier Techniques with Transistors;* 1 year; $9,000.

NEW YORK UNIVERSITY, New York, N. Y.; George Gerard, Department of Aeronautical Engineering; *Effect of High Temperatures on Engineering Materials;* 1 year; $10,000.

NEW YORK UNIVERSITY, New York, N. Y.; John P. Nielsen, Department of Metallurgical Engineering; *Kinetics of Transformation Nuclei Appearance;* 1 year; $5,700.

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; Robert Allen McAllister, Department of Chemical Engineering; *Physical Properties of Liquid Mixtures;* 2 years; $12,700.

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Edward C. Lawson, Department of Mechanical Engineering; *Heat Transfer in Rectangular Channels;* 2 years; $14,300.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; George Thodos and D. F. Mason, Chemical Engineering Department; *Vapor-Liquid Equilibrium Studies;* 3 years; $8,400.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Marcel K. Newman, Department of Mechanical Engineering; *Thermo-Elastic Damping in Impact Vibrations of Beams;* 2 years; $14,900.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Giuseppe Parravano, Department of Chemical Engineering; *Zone Melting Techniques in Fractional Crystallization;* 1 year; $3,000.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Kwang-Tzu Yang, Department of Mechanical Engineering; *Unsteady Laminar Boundary Layers with Heat Transfer;* 2 years; $12,600.

OHIO STATE UNIVERSITY, Columbus, Ohio; Hamilton Gray, Department of Civil Engineering; *Climatic Influences on the Moisture Content and Density of Granular Soils;* 3 years; $10,300.

OHIO STATE UNIVERSITY, Columbus, Ohio; Webster B. Kay, Department of Chemical Engineering; *Phase Behavior of Liquid and Gaseous Systems;* 1 year; $10,000.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; Gordon L. Nelson, Department of Agricultural Engineering; *Micro Meteorology Research;* 1 year; $9,900.

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; O. K. Crosser, Chemical Engineering Department, University of Oklahoma; *Heat Transfer and Pressure Drop in Fluids Near Their Critical Points;* 3 years; $14,500.

OREGON STATE COLLEGE, Corvallis, Oreg.; Harvey D. Christensen, Department of Mechanical Engineering; *Nonlinear Oscillation Theory for the Behavior of Elastic Beam-Columns;* 1 year; $3,100.

OREGON STATE COLLEGE, Corvallis, Oreg.; James G. Knudsen, Department of Chemical Engineering; *Heat Transfer Coefficients in Baffled Tubular Heat Exchangers;* 2 years; $4,900.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Arthur Rose, Department of Chemical Engineering; *Rigorous Multicomponent Distillation of Calculations;* 2 years; $15,600.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; H. I. Tarpley, Department of Electrical Engineering; *Training and Research in Computing Applications;* 1 year; $16,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; R. W. Houston, Department of Chemical Engineering; *Liquid Phase Thermal Diffusion;* 3 years; $12,300.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Y. H. Ku, Department of Engineering Sciences; *Nonlinear Mechanics;* 3 years; $34,400.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Robert Maddin and R. A. Dodd, Department of Metallurgical Engineering; *Fatigue Failure of High Purity Fe-C and Fe-C-N Alloys;* 3 years; $25,600.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; M. C. Molstad, Department of Chemical Engineering; *Mixing on Bubble Cap Trays;* 1 year; $2,100.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; O. M. Salati, Department of Electrical Engineering; *Electrical Noise and Interference;* 1 year; $5,200.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; J. R. Burnett, Department of Electrical Engineering, Purdue University; *Servomechanism Power Flow;* 2 years; $18,600.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Alden H. Emery, Jr., Department of Chemical Engineering, Purdue University; *Thermal Diffusion of Liquids in Columns;* 2 years; $9,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Pekka Rautala, Department of Metallurgical Engineering, Purdue University; *Structure of Metallic Elements;* 2 years; $15,800.

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; Hendrick C. Van Ness, Department of Chemical Engineering; *Thermodynamic Properties of Liquid and Vapor Solutions;* 3 years; $23,900.

RUTGERS UNIVERSITY, New Brunswick, N. J.; J. Vincent Fitzgerald, School of Ceramics; *Anelasticity of Ceramic and Portland Cement Materials;* 1 year $8,400.

STANFORD UNIVERSITY, Stanford, Calif.; George Leppert, Department of Mechanical Engineering; *Local Boiling With Forced Convection;* 2 years; $11,600.

STANFORD UNIVERSITY, Stanford, Calif.; Karl Klotter, Department of Mechanical Engineering; *Non-Linear Oscillations;* 2 years; $15,400.

STANFORD UNIVERSITY, Stanford, Calif; Byrne Perry, Department of Civil Engineering; *Flow Through Porous Media;* 2 years; $16,100.

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J., Gregory J. Comstock, Department of Powder Metallurgy Laboratory; *Fine Particulate Metals;* 1 year; $12,500.

UNIVERSITY OF TENNESEE, Knoxville, Tenn.; Harry H. Ambrose, Department of Civil Engineering; *Boundary-Roughness Effects Upon Turbulent Flow;* 2 years; $19,300.

TEXAS AGRICULTURAL AND MECHANICAL RESEARCH FOUNDATION, College Station, Tex.; Warren Rice, Department of Mechanical Engineering; *Transfer Coefficients at Low Velocities;* 1 year; $9,500.

UNIVERSITY OF TEXAS, Austin, Tex.; Earnest F. Gloyna, Department of Civil Engineering; *Effect of Preaeration Upon the Treatment of Sewage;* 1 year; $5,900.

UNIVERSITY OF TEXAS, Austin, Tex.; John J. McKetta, Jr., Department of Chemical Engineering; *Distribution of H_2O, CO_2 and H_2S in Petroleum Hydrocarbon Mixtures;* 3 years; $28,700.

UNIVERSITY OF UTAH, Salt Lake City, Utah; Ivan B. Cutler, Department of Ceramics; *Rates of Oxidation of Carbides;* 3 years; $18,100.

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va,; Nelson F. Murphy, Department of Chemical Engineering; *Preparation and Properties of Some Metallic Compounds of Substituted Amines;* 1 year; $4,600.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; H. G. Larew, Department of Civil Engineering; *Strength and Deformation Characteristics of Fine Grained Soils;* 2 years; $13,500.

UNIVERSITY OF WISCONSIN, Madison, Wis.; P. C. Rosenthal, Department of mining and Metallurgy; *X-Ray Diffraction Studies of Minerals and Metals;* 1 year; $10,900.

YALE UNIVERSITY, New Haven, Conn.; Aris Phillips, Department of Civil Engineering; *Strain Hardening and Creep of Structural Members;* 2 years; $11,300.

YALE UNIVERSITY, New Haven, Conn.; Charles A. Walker and Harding Bliss, Department of Chemical Engineering; *Catalytic Gas Reactions;* 2 years; $14,800.

Environmental Biology

ERNEST E. TINKHAM, Indio, Calif.; *Environmental Relationships of Desert Sand Dune Biota;* 3 years; $3,200.

UNIVERSITY OF ARIZONA, Tuscon, Ariz.; Raymond M. Turner, Department of Botany; *Environmental Influences on Desert Tree Growth;* 3 years; $7,300.

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; J. A. Sealander, Jr., Department of Zoology; *Influence of External Conditions Upon Blood Values in Small Mammals;* 3 years; $10,400.

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; Lawrence C. Bliss, Biology Department; *Productivity of Alpine Plant Communities;* 1 year; $1,200.

UNIVERSITY OF BRITISH COLUMBIA, Vancouver, Canada; Paul A. Dehnel, Department of Zoology; *Acclimation of Oxygen Consumption to Temperature and Salinity in Crustaceans;* 3 years; $9,400.

BROOKLYN BOTANIC GARDEN, Brooklyn, N. Y.; Paul R. Burkholder, Director of Research; *Biological Productivity in Long Island Sound;* 2 years; $19,000.

BUTLER UNIVERSITY, Indianapolis, Ind.; Marion T. Hall, Department of Botany, *Variability in Southwestern Species of Juniperus;* 2 years; $5,600.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Theodore H. Bullock, Department of Zoology, Los Angeles, Calif.; *Physiological Ecology of Marine Invertebrates;* 2 years; $31,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Elmer R. Noble, Santa Barbara College, *Ecology of Protozoan Parasitism in Marine Fishes;* 3 years; $19,300.

UNIVERSITY OF CHICAGO, Chicago, Ill.; William C. Ashby, Department of Botany, *Ecological Life History of Basswood;* 2 years; $12,400.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Ralph G. Johnson, Department of Geology; *Organization of Communities in a Pennsylvania Sea;* 2 years; $8,000.

UNIVERSITY OF COLORADO, Boulder, Colo; Robert W. Pennak, Department of Biology; *Biostratonomy and Ecological History of Colorado Lakes;* 1 year; $5,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Harold C. Conklin, Department of Anthropology; *Ecological Study of Tropical Forest Agriculture;* 2 years; $16,000.

DARTMOUTH COLLEGE, Hanover, N. H.; Dana L. Abell, Department of Zoology; *Ecological Significance of First Order Streams;* 1 year; $2,000.

DARTMOUTH COLLEGE, Hanover, N. H.; F. H. Bormann, Department of Botany; *Transfer Between Adjacent Plant Root Systems;* 2 years; $10,900.

DUKE UNIVERSITY, Durham, N. C.; W. Dwight Billings, Department of Botany; *Comparative Physiological Ecology of Alpine and Arctic Plants;* 3 years; $30,700.

DUKE UNIVERSITY, Durham, N. C.; C. G. Bookhout, Director, Duke University Marine Laboratory; *Improvement of Research Facilities at the Duke University Marine Laboratory;* 1 year; $31,000.

DUKE UNIVERSITY, Durham, N. C.; Daniel A. Livingstone, Department of Zoology; *Late-Pleistocene Development of Freshwater Lakes;* 2 years; $8,300.

DUKE UNIVERSITY, Durham, N. C.; Henry J. Oosting and W. Dwight Billings, Department of Botany; *Vegetational and Species Problems in Ecology;* 1 year; $4,000.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; James N. Layne, Department of Biology; *Biology of the Florida Deer Mouse;* 2 years; $6,300.

HARVARD UNIVERSITY, Cambridge, Mass.; Hugh M. Raup, Department of Biology; *Development of Arctic Vegetation;* 1 year; $1,200.

HASKINS LABORATORIES, New York, N. Y.; S. H. Hutner, Microbiologist; *Ecology of Eurythermal Phytoflagellates;* 2 years; $15,200.

UNIVERSITY OF HAWAII, Honolulu, T. H.; Maxwell S. Doty, Department of Botany; *Primary Productivity of the Pacific;* 3 years; $23,500.

UNIVERSITY OF IDAHO, Moscow, Idaho; Philip C. Dumas, Department of Biological Sciences; *Ecological Relations of Phrynosoma and Rana Species;* 2 years; $4,500.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; Kenneth D. Carlander, Department of Zoology and Entomology; *Biology of Caddis and Mayflies;* 3 years; $14,500.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Henry S. Fitch, Department of Zoology; *Ecological Life History of the Copperhead;* 1 year; $4,700.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Charles D. Michener and Robert E. Beer, Department of Entomology; *Arthropod Associates of Army Ants;* 2 years; $5,300.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Philip S. Callahan, Department of Entomology; *Nocturnal Behavior of Certain Lepidoptera;* 2 years; $7,200.

UNIVERSITY OF MARYLAND, College Park, Md.; Daniel A. Livingstone, Department of Zoology; *Late-Pleistocene Development of Freshwater Lakes;* 2 years; $8,300.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Hilary B. Moore, The Marine Laboratory; *Level Sea Bottom Communities;* 1 year; $18,600.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; David C. Chandler and George H. Lauff, Great Lakes Research Institute; *Quantitative Measurement of Biological Productivity in the Great Lakes;* 1 year; $12,200.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Francis C. Evans, Director, Laboratory of Vertebrate Biology; *Insect Populations of a Natural Community;* 3 years; $13,300.

UNIVERSITY OF MISSOURI, Columbia, Mo.; Clair Kucera, Department of Botany; *The Establishment of a Prairie Research Station;* 1 year; $19,000.

MISSISSIPPI SOUTHERN COLLEGE, Hattiesburg, Miss.; Robert A. Woodmansee, Division of Biological Sciences; *Plankton Communities Along a Salinity Gradient;* 1 year; $1,700.

MONTANA STATE COLLEGE, Bozeman, Mont.; John C. Wright, Department of Botany and Bacteriology; *Limnology of Canyon Ferry Reservoir;* 2 years; $12,000.

UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; Calvin McMillan, Department of Botany; *Nature of Grassland Habitat;* 3 years; $13,900.

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; Lora M. Shields, Department of Biology; *Algal Flora in the Surface Crust of Arid Soils;* 2 years; $17,900.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Howard J. Dittmer, Biology Department; *Root Systems of Desert and Semiarid Land Plants;* 2 years; $9,100.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; James S. Findley, Department of Biology; *Interrelationships of Some New Mexico Mammals;* 3 years; $8,300.

NORTH DAKOTA AGRICULTURAL COLLEGE, Fargo, N. Dak.; Loren D. Potter, Botany Department; *Analysis of Seasonal Pollen Rain and its Correlation to Present Vegetation;* 1 year; $3,200.

OHIO STATE UNIVERSITY, Columbus, Ohio; Jacob Verduin, Natural Resources Institute; *Productivity of Microplankton;* 2 years; $4,000.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; Troy C. Dorris, Department of Zoology; *Bottom Fauna of the Middle Mississippi River;* 1 year; $500.

OREGON STATE COLLEGE, Corvallis, Oreg.; Henry P. Hansen, Dean, Graduate School; *Plant Communities of an Oregon Wilderness Area;* 3 years; $16,100.

OREGON STATE COLLEGE, Corvallis, Oreg.; Robert M. Storm, Department of Zoology; *Herpetofauna of a Primitive Forest;* 1 year; $5,600.

UNIVERSITY OF OREGON, Eugene, Oreg.; J. Arnold Shotwell, Museum of Natural History; *Effects of Environmental Change on Community Organization;* 2 years; $9,900.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Richard T. Hartman, Department of Biological Sciences; *Antagonistic Effects Between Algal Species;* 2 years; $7,600.

PORTLAND STATE COLLEGE, Portland, Oreg.; Quentin D. Clarkson, Division of Science; *Environmental Barriers to Hybridization in Iris;* 2 years; $4,000.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Murray F. Buell, Department of Botany; *Vegetation Ecology;* 1 year; $900.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Paul G. Pearson, Department of Zoology; *Small Mammal Populations in Relation to Burning of Ground Cover;* 2 years; $8,600.

SAM HOUSTON STATE TEACHERS COLLEGE, Huntsville, Tex.; Wilmot A. Thornton, Department of Biology; *Population Studies of Sympatric Anuran Species;* 3 years; $6,700.

STANFORD UNIVERSITY, Stanford, Calif.; Frederick A. Fuhrman, Department of Physiology; *Relation Between Temperature and Tissue Metabolism;* 1 year; $4,300.

SUL ROSS STATE COLLEGE, Alpine, Tex.; William W. Milstead, Department of Biology; *Interrelations of Canyon Lizard Species;* 4 years; $7,200.

UNIVERSITY OF TEXAS, Austin, Tex.; Howard T. Odum, Institute of Marine Science, Port Aransas, Texas; *Ecological Microcosms;* 3 years; $21,800.

TULANE UNIVERSITY, New Orleans, La.; Willis A. Eggler, Department of Botany, Newcomb College; *Relation of Temperature and Moisture to Growth and Reproductive Processes;* 2 years; $14,700.

TULANE UNIVERSITY, New Orleans, La.; Norman C. Negus, Zoology Department; *Population Dynamics of the Cotton Rat;* 2 years; $12,900.

VANDERBILT UNIVERSITY, Nashville, Tenn.; Elsie Quarterman, Department of Biology; *Hardwood Stands of the Southeastern Coastal Plain;* 3 years; $8,100.

WABASH COLLEGE, Crawfordsville, Ind.; Eliot C. Williams, Jr., Department of Zoology; *Loss of Pigmentation in Cave Planarians;* 2 years; $4,000.

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; Donald S. Farner, Department of Zoology; *Hypothalamic Neurosecretory Activity in Relation to Daily Photoperiod;* 2 years; $14,000.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; W. T. Edmondson, Department of Zoology; *Arid Land Limnology;* 2 years; $20,600.

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; H. L. Barnett and V. G. Lilly, Department of Plant Pathology, Bacteriology and Entomology; *Parasitism of Piptocephalis on Other Fungi;* 2 years; $12,200.

UNIVERSITY OF WISCONSIN, Madison, Wis.; J. T. Curtis and Grant Cottam, Department of Botany; *Integration of the Oak Forest Community;* 3 years; $19,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; John C. Neese, Department of Zoology; *Physiological Ecology of Deep Water Chironomidae;* 2 years; $11,800.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; George L. Clarke, Marine Biologist; *Measurement of Light in the Sea;* 3 years; $56,700.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Bostwick H. Ketchum; *Nitrogen Cycle in Coastal Sea Waters;* 3 years; $20,700.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Bostwick H. Ketchum; *Chemical Composition of Phytoplankton as Related to Environmental Changes;* 3 years; $36,700.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; John H. Ryther; *Basic Productivity of the Sea;* 3 years; $42,000.

YALE UNIVERSITY, New Haven, Conn.; Edward S. Deevey, Geochronometric Laboratory; *Paleolimnology Studies;* 1 year; $1,300.

Genetic Biology

BRANDEIS UNIVERSITY, Waltham, Mass.; Margaret Lieb, Department of Biology; *Mechanisms of Mutation in Microorganisms;* 2 years; $13,000.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; Howard C. Stutz, Department of Botany; *Cytogenetic Studies of* Secale *L. and Related Grasses;* 1 year; $5,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; N. H. Horowitz, Department of Biology; *Genetic Aspects of Enzyme Synthesis;* 3 years; $33,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; I. Michael Lerner and Everett R. Dempster, Department of Poultry Husbandry; *Polygenic Variability;* 3 years; $52,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Charles M. Rick, Department of Vegetable Crops, Davis, Calif.; *Cytogenetics of Lycopersicon Hybrids;* 3 years; $17,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; G. Ledyard Stebbins, Department of Genetics, Davis, Calif.; *Cytogenetics in the Dactylis Glomerata Complex;* 3 years; $21,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; David P. Bloch, Department of Zoology, Los Angeles, Calif.; *Chromosomal Complex During Cell Division and Cell Development;* 2 years; $9,400.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Taylor Hinton, Department of Zoology, Los Angeles, Calif.; *Genes in the Metabolism of Nucleic Acid;* 2 years; $24,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Richard W. Siegel, Department of Biology, Los Angeles, Calif.; *Genetic Factors Controlling the Duration of Immaturity in Paramecium Aurelia;* 3 years; $8,500.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Edward D. Garber, Department of Botany; *Chromosomal and Genetic Homology in the Genus Collinsia;* 3 years; $13,000.

CHILDREN'S CANCER RESEARCH FOUNDATION, INC., Boston, Mass.; George Yerganian; *Genetics and Cytology of the Chinese Hamster;* 3 years; $24,700.

COLUMBIA UNIVERSITY, New York, N. Y.; Stanley M. Gartler, Institute for the Study of Human Variation; *Human Biochemical Genetics Utilizing Twins;* 2 years; $13,500.

COLUMBIA UNIVERSITY, New York, N. Y.; Jerry Hirsch, Department of Psychology; *Experimental Behavior Genetics;* 2 years; $11,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Lindsay S. Olive, Department of Botany; *Genetics of Homothallic Fungi;* 2 years; $13,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Francis J. Ryan, Department of Zoology; *Mutation and Selection in Microbial Populations;* 3 years; $33,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Ruth Sager, Department of Zoology; *Comparative Studies of Chromosomal and Non-Chromosomal Heredity in* Chlamydomonas; 1 year; $11,100.

HARVARD UNIVERSITY, Cambridge, Mass.; R. P. Levine, The Biological Laboratory; *Metallic Ions and Genetic Recombination in Chlamydomonas Reinhardi;* 2 years; $15,000.

HARVARD UNIVERSITY, Cambridge, Mass.; John R. Raper, Department of Biology; *Genetics and Physiology of Tetrapolarity in the Higher Fungi;* 2 years; $15,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; John R. Laughman, Department of Botany; *Mutation, Duplication, and Complex Gene Structure in Maize;* 4 years; $24,000.

INDIANA UNIVERSITY, Bloomington, Ind.; Tracy M. Sonneborn, Department of Zoology; *Antigens of Paramecium Aurelia;* 1 year; $8,500.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; William R. Lockhart and Lloyd Y. Quinn, Department of Bacteriology; *Biochemical Genetics of Motility in Bacteria;* 1 year; $3,000.

LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; James C. King; *Genetic Heterozygosity and Developmental Variation;* 2 years; $23,500.

UNIVERSITY OF MARYLAND, College Park, Md.; D. T. Morgan, Jr., Department of Botany; *Frequencies of Haploids in Capsicum Frutescens Following X-Irradiation;* 3 years; $6,200.

CITY OF HOPE MEDICAL CENTER, Duarte, Calif.; William D. Kaplan, Chief, Section of Genetics; *Sterility Component of X-ray and Chemically Induced Dominant Lethals in D. Melanogaster;* 1 year; $7,500.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; David L. Nanney, Department of Zoology; *Protozoan Genetics;* 3 years; $25,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Erich Steiner, Department of Botany; *Incompatibility Allele Systems in Oenothers;* 3 years; $7,000.

UNIVERSITY OF MISSOURI, Columbia, Mo.; E. R. Sears, Department of Field Crops; *Cytogenetic Studies of Wheat;* 3 years; $19,900.

NEW YORK STATE COLLEGE OF AGRICULTURE, Ithaca, N. Y.; L. F. Randolph, Department of Botany; *Cytogenetic Studies of Horticultural and Crop Plants;* 3 years; $12,000.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Paul Grun, Department of Botany; *Cytogenetic Studies in the Genus Solanum;* 2 years; $10,000.

ROSCOE B. JACKSON MEMORIAL LABORATORY, Bar Harbor, Maine; Margaret C. Green; *Development in Short-Ear Mutant Mice;* 2 years; $10,000.

RUTGERS, THE STATE UNIVERSITY, NEW BRUNSWICK, N. J.; Waclaw Szybalski, Institute of Microbiology; *Genetics of Actinomyces;* 2 years; $12,000.

SMITH COLLEGE, Northampton, Mass.; Pauline B. Shapard, Department of Zoology; *Effects of a Suppressor Mutant in Drosophila Melanogaster;* 2 years; $12,500.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Giuseppe Bertani, Department of Medical Microbiology; *Virus-Host Cell Relationship in Lysogenic Bacteria;* 2 years; $40,000.

STANFORD UNIVERSITY, Stanford, Calif.; David D. Perkins, Department of Biology, *Genetic Recombination in* Neurospora; 2 years; $25,000.

UNIVERSITY OF TEXAS, Austin, Tex.; W. S. Stone and M. R. Wheeler, Department of Zoology; *Collection of Various Diptera for Cytogenetic Analysis;* 1 year; $2,100.

TRINITY COLLEGE, Hartford, Conn.; Stanley Zimmering, Department of Biology; *Interchromosomal Effect on Crossing-over and Segregation in Drosophila;* 2 years; $4,350.

TULANE UNIVERSITY, New Orleans, La.; E. Peter Volpe, Department of Zoology; *Genetics and Systematics in the Genera Bufo and Rana;* 2 years; $10,000.

UNIVERSITY OF UTAH, Salt Lake City, Utah; Robert K. Vickery, Jr., Department of Genetics; *Genetic Studies in Mimulus;* 2 years; $9,000.

WASHINGTON COLLEGE, Chestertown, Md.; Frank C. Erk, Department of Biology; *Genetic Control of Differentiation in Drosophila;* 1 year; $5,000.

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; Charles Yanofsky, Department of Microbiology; *Genetic Control of Enzyme Formation;* 3 years; $25,000.

YALE UNIVERSITY, New Haven, Conn.; Charles L. Remington, Department of Zoology; *Evolution in Natural Populations of Lepidoptera;* 3 years; $24,000.

Mathematical Sciences

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; J. B. Rosser, Chairman; *Mathematical Logic;* 5 weeks; $29,500.

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; J. H. Hodges, Department of Mathematics; *Matrices Over a Finite Field;* 2 years; $6,600.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; E. F. Beckenbach, Department of Mathematics, Los Angeles; *Convex Sets and Functions;* 2 years; $16,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; M. R. Hestenes and C. B. Tompkins, Department of Mathematics, Los Angeles; *Sparse Multivariate Tables;* 1 year; $5,800.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; John Myhill, Department of Philosophy; *Recursion Theory;* 18 months; $11,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Alfred Tarski, Department of Mathematics; *Theory of Models;* 2 years; $24,000.

CARLETON COLLEGE, Northfield, Minn.; Kenneth O. May, Department of Mathematics and Astronomy; *Research and Training in Mathematics;* 4 years; $27,300.

CATHOLIC UNIVERSITY OF AMERICA, Washington, D. C.; Eugene Lukacs, Department of Mathematics; *Mathematical Statistics;* 2 years; $5,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; S. S. Chern and E. H. Spainer, Department of Mathematics; *Algebraic Topology and its Applications;* 2 years; $42,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Andre Weil, Department of Mathematics; *Abelian Varieties and Their Applications;* 1 year; $8,000.

COLUMBIA UNIVERSITY, New York, N. Y.; R. V. Kadison and I. M. Singer; Department of Mathematics; *Group Representations and Operator Theory;* 1 year; $13,100.

COLUMBIA UNIVERSITY, New York, N. Y.; Ellis R. Kolchin, Department of Mathematics; *Differential Algebra and Group Varieties;* 2 years; $13,500.

UNIVERSITY OF CONNECTICUT, Storrs, Conn.; Richard P. Gosselin, Department of Mathematics; *Fourier Series and Trigonometric Interpolating Polynomials;* 2 years; $4,300.

UNIVERSITY OF DELAWARE, Newark, Del.; Chris C. Braunschweiger, Department of Mathematics; *Banach Space Geometry;* 2 years; $5,800.

DUKE UNIVERSITY, Durham, N. C.; John J. Gergen, Department of Mathematics, *Topics in Analysis and Topology;* 2 years; $21,800.

EMMANUEL MISSIONARY COLLEGE, Berrien Springs, Mich.; E. J. Specht, Department of Mathematics; *Linear Operators and Potential Theory;* 2 years; $10,000.

UNIVERSITY OF GEORGIA, Athens, Ga.; M. K. Fort, Jr., Department of Mathematics; *Problems in Topology;* 2 years; $19,500.

UNIVERSITY OF IDAHO, Moscow, Idaho; Kenneth A. Bush, Department of Mathematics; *Estimation and Perfect Samples;* 18 months; $2,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; H. R. Brahana, Department of Mathematics; *Structure of Infinite P-Groups;* 1 year; $5,300.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; A. H. Taub, Digital Computer Laboratory; *Analytical Program for Digital Computers;* 2 years; $32,300.

INDIANA UNIVERSITY, Bloomington, Ind.; C. Truesdell, Institute for Mathematics and Mechanics; *Theoretical and Historical Studies in Mechanics;* 1 year; $7,700.

INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; Arne Beurling and Hassler Whitney, School of Mathematics; *Studies in Mathematics;* 2 years; $42,000.

INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; Deane Montgomery, Department of Mathematics; *Regular Mappings and Homotopy;* 3 months; $1,400.

INSTITUTE OF MATHEMATICAL STATISTICS, Santa Monica, Calif.; Oscar Kempthorne; *Summer Institute on Analysis of Variance;* 6 weeks; $11,600.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Wei-Liang Chow, Department of Mathematics; *Algebraic Geometry Over Abstract Fields;* 2 years; $31,300.

UNIVERSITY OF KANSAS, Lawrence, Kans.; N. Aronszajn, Department of Mathematics; *Boundary Value Problems;* 6 months; $3,000.

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; V. F. Cowling; Department of Mathematics; *Summability and Analytic Functions;* 1 year; $7,700.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; E. V. Schenkman and H. Jacob, Department of Mathematics; *Endomorphism Semigroups;* 2 years; $22,000.

MARQUETTE UNIVERSITY, Milwaukee, Wis.; L. J. Heider, Department of Mathematics; *Functionals in Integration Theory;* 2 years; $7,900.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Kenkichi Iwasawa; Department of Mathematics; *Galois Extensions of Algebraic Number Fields;* 2 years; $9,300.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Nathaniel Coburn, Department of Mathematics; *Non-Steady Flow of Compressible Fluids;* 2 years; $10,800.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; F. M. Henderson, Department of Engineering Mechanics; *Graphical Representation of Elliptic Functions;* 1 year; $15,300.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; E. E. Moise, Department of Mathematics, *The Topology of Manifolds;* 18 months; $8,200.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; R. L. Wilder, Department of Mathematics; *Mappings of Manifolds;* 1 year; $9,200.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; E. Calabi, L. W. Green, and H. Yamabee, Department of Mathematics; *Structure of Manifolds;* 1 year; $7,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Seizo Ito, Department of Mathematics; *Partial Differential Equations on Manifolds;* 1 year; $6,500.

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; Paul A. Smith, Chairman, Division of Mathematics; *Advisory Committee on Travel Grants;* 2 years; $2,000.

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; Milton Abramowitz, Chief of the Computing Laboratory; *Mathematical Tables;* 2 years; $120,000.

NEW YORK UNIVERSITY, New York, N. Y.; R. Courant, Institute of Mathematical Sciences; *Research and Training in Mathematics;* 1 year; $50,000.

NEW YORK UNIVERSITY, New York, N. Y.; Avron Douglis, Department of Mathematics; *Equations of Wave Propagation;* 2 years; $8,000.

NEW YORK UNIVERSITY, New York, N. Y.; Wilhelm Magnus, Institute of Mathematical Sciences; *Free Groups and Nielsen Transformations;* 2 years; $15,400.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; R. P. Boas and J. A. Dieudonne, Department of Mathematics; *Research in Analysis, Algebra and Geometry;* 2 years; $18,000.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; W. M. Boothby, Department of Mathematics; *Complex Analytic Manifolds;* 2 years; $10,900.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; Franklin A. Graybill, Department of Mathematics; *Estimates of the Components of Variance;* 2 years; $15,200.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Haskell B. Curry, Department of Mathematics; *Problems in Mathematical Logic;* 2 years; $18,200.

PHILANDER SMITH COLLEGE, Little Rock, Ark.; Lee Lorch, Department of Mathematics; *Singular Integrals and Lebesgue Constants;* 2 years; $9,800.

PURDUE UNIVERSITY, Lafayette, Ind.; Meyer Jerison and Leonard Gillman; Department of Mathematics; *Rings of Functions;* 2 years; $29,500.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Dorothy Bernstein, Department of Mathematics; *Solutions of Partial Differential Equations;* 2 years; $15,400.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Albert L. Whitman; Department of Mathematics; *Cyclotomic Theory;* 2 years; $9,500.

STANFORD UNIVERSITY, Stanford, Calif.; Stefan Bergman, Department of Mathematics; *Functions of Several Complex Variables;* 2 years; $28,000.

STANFORD UNIVERSITY, Stanford, Calif.; Bernard Epstein, Department of Mathematics; *Free Boundary Problems in Hydrodynamics;* 1 year; $6,600.

STANFORD UNIVERSITY, Stanford, Calif.; Solomon Feferman, Applied Mathematics and Statistics Laboratory; *Generalized Product Theories;* 1 year; $2,200.

STANFORD UNIVERSITY, Stanford, Calif.; Charles Loewner, Department of Mathematics; *Semi-Groups and Functions of Matrices;* 2 years; $14,800.

SYRACUSE UNIVERSITY, Syracuse, N. Y.; A. Edrei, Department of Mathematics; *Meromorphic Functions;* 2 years; $10,200.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; O. G. Harrold, Jr., Department of Mathematics; *Generalization of the Schoenflies of Extension Theorem;* 3 years; $16,100.

UNIVERSITY OF TEXAS, Austin, Tex.; H. S. Vandiver, Department of Mathematics; *Theory of Numbers;* 2 years; $32,000.

WAYNE UNIVERSITY, Detroit, Mich,; Samuel Kaplan, Department of Mathematics; *Cartesian Product Spaces;* 1 year; $6,000.

WAYNE STATE UNIVERSITY, Detroit, Mich.; Karl Zeller, Department of Mathematics; *Summability Methods;* 1 year; $7,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; R. H. Bruck, Department of Mathematics; *Projective Planes;* 2 years; $17,200.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Laurence C. Young, Department of Mathematics; *Topological Problems in the Calculus of Variations;* 2 years; $9,000.

XAVIER UNIVERSITY OF LOUISIANA, New Orleans, La.; Charles B. Bell, Jr., Department of Mathematics; *Distribution-Free Statistics;* 2 years; $9,200.

YALE UNIVERSITY, New Haven, Conn.; G. A. Hedlund, Department of Mathematics; *Research in Algebra, Analysis and Geometry;* 2 years; $28,700.

YALE UNIVERSITY, New Haven, Conn.; Oystein Ore, Department of Mathematics; *Theory of Graphs;* 18 months; $5,800.

YALE UNIVERSITY, New Haven, Conn.; C. F. Rickart and J. T. Schwartz, Department of Mathematics; *Algebraic and Analytical Operator Theory;* 1 year; $20,000.

Molecular Biology

HUGO BAUER, National Institutes of Health, Bethesda, Md.; *Analysis and Identification of Products of Histidine Metabolism;* 1 year; $4,000.

UNIVERSITY OF ALABAMA, University, Ala.; Joseph C. O'Kelley, Department of Biology; *Cellulose Synthesis by Lyophilized Preparations of Acetobacter Xylinum;* 2 years; $11,500.

BOYCE THOMPSON INSTITUTE FOR PLANT RESEARCH, INC., Yonkers, N. Y.; Beatrice S. Magdoff; *Structure of Southern-Bean Mosaic Virus;* 2 years; $21,500.

BRANDEIS UNIVERSITY, Waltham, Mass.; Harold P. Klein, Department of Biology; *Formation of Alpha-Amylase by Pseudomonas Saccharophila;* 2 years; $14,000.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; Jay V. Beck, Department of Bacteriology; *Nucleic Acid Formation by Certain Bacilli During Sporulation;* 3 years; $19,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif; Max Delbruck, Division of Biology; *Light Growth Responses of Phycomyces;* 5 years $45,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Richard S. Schweet, Division of Biology; *Soluble Enzymes Related to Protein Synthesis;* 3 years; $21,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; William J. Hartman, Department of Physiological Chemistry; *Dihydroxyphenylserine Decarboxylase;* 2 years; $12,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Gordon MacKinney, Department of Food Technology; *Biosynthesis of Carotenoids;* 3 years; $21,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; D. Rao Sanadi, Department of Physiological Chemistry, School of Medicine; *Mechanism of Substrate Level Phosphorylation;* 3 years; $30,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Howard K. Schachman, Department of Biochemistry; *Physical Chemical Studies on Macromolecules of Biological Interest;* 4 years; $44,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; R. Y. Stanier, Department of Bacteriology; *Physiology of Photosynthetic Bacteria;* 5 years; $51,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Arthur L. Black, School of Veterinary Medicine, Davis, Calif.; *Biosynthesis of Amino Acids in Dairy Cows;* 2 years; $14,500.

COLLEGE OF CHARLESTON, Charleston, S. C.; Joseph R. Merkel, Fort Johnson Marine Biological Laboratory; *Photocatalytic and Enzymatic Flavin Systems;* 1 year; $4,500.

CHICAGO MEDICAL SCHOOL, Chicago, Ill.; A. Robert Goldfarb, Department of Biochemistry; *Basic Properties of the Peptide Bond;* 2 years; $10,000.

UNIVERSITY OF COLORADO, Boulder, Colo.; Robert W. Cowgill, Department of Biochemistry; *Metabolism of Methylhistidines and Anserine in Animal Tissues;* 3 years; $8,500.

COLUMBIA UNIVERSITY, New York, N. Y.; Barbara W. Low, Department of Biochemistry; *Crystal Structure Analysis of Insulin and Oxytocin;* 3 years; $39,000.

COLUMBIA UNIVERSITY, New York, N. Y.; Stuart W. Tanenbaum, Department of Microbiology; *Biosynthesis of Patulin and Related Aromatic Compounds by Members of the Penicillium Species;* 2 years; $16,000.

CORNELL UNIVERSITY, Ithaca, N. Y.; Martin Gibbs, Department of Biochemistry and Nutrition; *Carbohydrate Dissimilation in the Autotrophic* Cell; 3 years; $35,000.

DUKE UNIVERSITY, Durham, N. C.; Aubrey W. Naylor, Department of Botany; *Relation of Biochemical Differentiation and Chloroplast Morphogenesis to Initiation of Photosynthetic Process;* 3 years; $9,000.

EMORY UNIVERSITY, Emory University, Ga.; Frank W. Fales, Department of Biochemistry; *Alkali-Insoluble Reserve Carbohydrate of Yeast Cells;* 2 years; $12,000.

EMORY UNIVERSITY, Emory University, Ga.; Elliot Juni, Department of Bacteriology and Immunology; *Mode of Action of Diphosphothiamin in Carbohydrate Metabolism;* 6 months; $1,900.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Arthur L. Koch, Department of Biochemistry, College of Medicine; *Detection and Estimation of the Activity of Individual Enzyme Molecules;* 3 years; $22,000.

FORDHAM UNIVERSITY, New York, N. Y.; Friedrich F. Nord, Department of Organic Chemistry and Enzymology; *Structural, Biochemical, and Physico-Chemical Studies on Lignin;* 3 years; $21,000.

HAVERFORD COLLEGE, Haverford, Pa.; Ariel G. Loewy, Biology Department; *Cytoplasmic Proteins Related to Conversion of Chemical Energy to Work in a Myxomycete;* 3 years; $16,500.

HARVARD UNIVERSITY, Cambridge, Mass.; Konrad Bloch, Department of Chemistry; *Mechanism of Synthesis of Steroids in Biological Systems;* 4 years; $42,000.

HARVARD UNIVERSITY, Cambridge, Mass.; Paul Doty, Department of Chemistry; *Polypeptide Synthesis;* 3 years; $33,000.

HARVARD UNIVERSITY, Cambridge, Mass.; John T. Edsall, Biological Laboratories; *Physical Chemistry of Amino Acids, Peptides and Proteins;* 3 years; $38,000.

HARVARD UNIVERSITY, Cambridge, Mass.; Lowell P. Hager, Department of Chemistry; *Enzymatic Activation Mechanisms;* 3 years; $22,000.

HARVARD UNIVERSITY, Cambridge, Mass.; T. T. Tchen, Department of Chemistry; *Conversion of Inorganic Sulfur to Organic Sulfur;* 2 years; $12,000.

HARVARD UNIVERSITY, Cambridge, Mass.; James D. Watson, Department of Biology; *Structure of Bacterial Microsomes;* 2 years; $30,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Lindsay M. Black, Department of Botany; *Plant Virus Investigations on Those With Long Incubation Periods in Their Insect Vectors;* 3 years; $22,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Max E. Rafelson, Jr., Department of Biological Chemistry, College of Medicine, Chicago, Ill.; *Growth and Two-Carbon Metabolism in Microorganisms;* 2 years; $15,000.

INDIANA UNIVERSITY, Bloomington, Ind.; Walter A. Konetzka, Department of Bacteriology; *Microbial Dissimilation of Naturally Occurring Lignans;* 2 years; $6,000.

INDIANA UNIVERSITY, Bloomington, Ind.; Henry R. Mahler, Department of Chemistry; *Mode of Synthesis of Flavoproteins and Other Respiratory Enzymes;* 3 years; $30,000.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; S. Arnoff, Department of Botany and Plant Pathology; *Intercellular Movement of Organic Compounds;* 2 years; $8,000.

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; R. E. Kallio, Department of Bacteriology, College of Medicine; *Bacterial Metabolism of One-Carbon Compounds;* 3 years; $16,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; W. D. McElroy, McCollum-Pratt Institute; *Conversion of Chemical Energy Into Light Energy By Biological Systems;* 3 years; $24,000.

KYOTO UNIVERSITY, Maizuru, Japan; Hiroshi Fujita, Department of Fisheries; *Differential Equation for the Ultracentrifuge;* 2 years; $1,700.

LAWRENCE COLLEGE, Appleton, Wis.; W. Mary Griffiths; *Photosynthetic Pigment System of Rhodopseudomonas Spheroides;* 1 year; $3,000.

LAWRENCE COLLEGE, Appleton, Wis.; Robert M. Rosenberg, Department of Chemistry; *Interaction of Proteins With Alcohols and Detergents;* 3 years; $6,000.

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; R. Duncan Dallam and John F. Taylor, Department of Biochemistry, School of Medicine; *Chemical Composition of and Enzymes Associated With Cytoplasmic Granules;* 3 years; $24,000.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Reinhold Benesch; *Structure and Function of Proteins With Special Reference to Their Sulfur-Containing Moieties;* 4 years; $31,000.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Andrew G. Szent-Gyorgyi, Institute of Muscle Research; *Completion of an Ultracentrifuge Laboratory for Biological Research;* 1 year; $10,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; David F. Waugh, Department of Biology; *Interactions of Proteins;* 3 years; $32,000.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Robert S. Bandurski, Department of Botany and Plant Pathology; *Sulfate Reduction and Its Incorporation Into Organic Compounds;* 3 years; $29,000.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Harold M. Sell, Department of Agricultural Chemistry; *Biochemistry of Natural and Synthetic Growth Substances in Higher Plants;* 2 years; $11,500.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; M. J. Coon, Department of Biological Chemistry; *Omega Oxidation in Fatty Acid and Amino Acid Metabolism;* 3 years; $39,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; David R. Briggs, Department of Agricultural Biochemistry; *Chemical and Physical Properties and Structure of Proteins in Relation to Specific Biological Function;* 3 years; $22,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Samuel Kirkwood, Department of Agricultural Biochemistry; *Enzyme Systems Concerned With the Metabolism of Iodine in the Animal Body;* 3 years; $15,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Fred Smith, Department of Agricultural Biochemistry; *Detailed Structure of Polysaccharides*; 3 years; $18,000.

NEW YORK UNIVERSITY, New York, N. Y.; Paul R. Gross, Department of Biology; *Chemistry, Enzymology and Ultrastructure of the Amphibian Yolk Platelet;* 3 years; $8,500.

NEW YORK UNIVERSITY, New York, N. Y.; Milton Levy, Department of Biochemistry, School of Dentistry; *Chemical Structure of Collagen and Other Fibrous Proteins;* 3 years; $32,000.

NEW YORK UNIVERSITY, New York, N. Y.; Werner K. Maas, Department of Pharmacology, College of Medicine; *Regulation of Enzyme Synthesis in Bacteria;* 3 years; $15,000.

NEW YORK UNIVERSITY, New York, N. Y.; Robert C. Warner, Department of Biochemistry, College of Medicine; *Physical Properties of Enzymatically Synthesized Polynucleotides and of Ribonucleic Acid;* 3 years; $47,000.

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; Harold J. Evans, Department of Botany; *Oxidative Processes in Leguminous Plants;* 3 years; $25,000.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; John W. Hastings, Department of Biological Sciences; *Luminescence in the Marine Dinoflagellates;* 3 years; $29,000.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Irving M. Klotz, Department of Chemistry; *Protein Complexes: Interactions of Proteins With Disulfide Compounds;* 3 years; $31,000.

OHIO STATE UNIVERSITY, Columbus, Ohio; George C. Webster, Department of Agricultural Biochemistry; *Protein and Ribonucleic Acid Synthesis in a Cell-Free System From Plants;* 2 years; $7,000.

OREGON STATE COLLEGE, Corvallis, Oreg.; W. David Loomis, Department of Chemistry; *Biosynthesis of Terpens in Mint (Mentha, sp.);* 2 years; $8,000.

UNIVERSITY OF OREGON, Eugene, Oreg.; Robert F. Labbe, Department of Biochemistry, Medical School, Portland, Oreg.; *The Mechanism by Which Iron Is Incorporated Into Heme;* 2 years; $16,000.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Andrew A. Benson, Department of Agricultural and Biological Chemistry; *Polyphosphate Metabolism of Plants;* 3 years; $23,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Thomas F. Anderson, The Johnson Foundation for Medical Physics, School of Medicine; *Morphology and Growth of Bacteriophages;* 5 years; $53,000.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Ronald Bentley, Department of Biochemistry and Nutrition, School of Public Health; *Carbohydrate Metabolism in Molds;* 3 years; $24,000.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Peter S. Olmsted, Department of Biochemistry, School of Medicine; *Mechanism of* In Vitro *Polynucleotide Synthesis;* 2 years; $10,000.

PUBLIC HEALTH RESEARCH INSTITUTE OF THE CITY OF NEW YORK, INC., New York, N. Y.; Sarah Ratner, Division of Nutrition and Physiology; *Enzymatic Mechanisms of Amino Nitrogen Transfer and Urea Formation;* 3 years; $32,000.

REED COLLEGE, Portland, Oreg.; Lewis H. Kleinholz, Department of Biology; *Crustacean Pigmentary System;* 2 years; $6,000.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, New York, N. Y.; Stanford Moore and William H. Stein; *Automatic Recording Apparatus for Chromatography;* 1 year; $7,400.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Otto J. Plescia, Institute of Microbiology; *Fixation of Complement by Sensitized Red Blood Cells;* 2 years; $15,000.

ST. JOSEPH'S COLLEGE, Collegeville, Ind.; Jay Barton, II, Department of Biology; *Nucleoprotein Complexes, With Special Reference to the Insoluble Proteins of Cell Nuclei;* 2 years; $20,000.

SOUTHERN ILLINOIS UNIVERSITY, Carbondale, Ill.; Maurice Ogur, Department of Microbiology; *Synthesis and Degradation of Polyphosphates in Yeast;* 3 years; $16,000.

UNIVERSITY OF TEXAS, Austin, Tex.; Austen F. Riggs, Department of Zoology; *Hemoglobin and Nitrogen Fixation;* 3 years; $17,000.

TUFTS UNIVERSITY, Medford, Mass.; Erich Heinz, Department of Biochemistry, School of Medicine, Boston, Mass.; *Basis of Active Transport;* 3 years; $20,000.

VANDERBILT UNIVERSITY, Nashville, Tenn.; Leon W. Cunningham, Department of Biochemistry; *Enzymatic Hydrolysis and Chemical Properties of Purified Glycoproteins;* 3 years; $15,000.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Mildred Cohn, Department of Biological Chemistry; *Phosphorylation and Phosphate Transfer Reactions;* 3 years; $30,000.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Arthur Kornberg, Department of Microbiology, School of Medicine; *Enzymatic Synthesis of Desoxyribonucleic Acid and Studies of Virus Formation;* 5 years; $87,000.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Jack L. Strominger, Department of Pharmacology, School of Medicine; *Uridine Diphosphoglucose Dehydrogenase;* 2 years; $5,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Helmut Beinert, Institute for Enzyme Research; *Occurrence of Semiquinoid Intermediates in Flavoprotein Catalysis;* 1 year; $4,800.

UNIVERSITY OF WISCONSIN, Madison, Wis.; David E. Green, Institute of Enzyme Research; *Structure and Function of Mitochondria;* 5 years; $60,000.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Francis A. Richards and Bostwick H. Ketchum; *Physical and Chemical Properties of Chlorophyll C and Other Plankton Pigments;* 2 years; $10,000.

YALE UNIVERSITY, New Haven, Conn.; Henry A. Harbury, Department of Biochemistry; *Protein-Prosthetic Group Interaction;* 1 year; $8,000.

YALE UNIVERSITY, New Haven, Conn.; G. E. Hutchinson, Department of Zoology; *Diagenesis of Chlorophylls in Lake Sediments;* 1 year; $1,150.

YALE UNIVERSITY, New Haven, Conn.; Gifford B. Pinchot, Department of Microbiology; *Phosphorylation Coupled to Electron Transport in Cell-Free Bacterial Extracts;* 3 years; $19,000.

YALE UNIVERSITY, New Haven, Conn.; Julian M. Sturtevant, Department of Chemistry; *Physico-Chemical Studies of Protein and Related Reactions With Emphasis on Thermochemistry;* 3 years; $39,000.

Physics

BROWN UNIVERSITY, Providence, R. I.; Rohn Truell, Division of Applied Mathematics; *Ultrasonic Study of Defects in Solids;* 2 years; $16,900.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; W. H. Barkas, Radiation Laboratory; *Information on Nuclear Track Emulsions;* 6 months; $2,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Francis A. Jenkins, Department of Physics; *Nuclear Moments From Optical Hyperfine Structure;* 2 years; $15,100.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; David S. Saxon, Department of Physics, Los Angeles, Calif.; *Research in Theoretical Physics;* 2 years; $24,700.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Sergio de Benedetti, Department of Physics; *Behavior of Slow Positrons in Solids;* 2 years; $31,900.

UNIVERSITY OF CHICAGO, Chicago, Ill.; R. S. Mulliken, Department of Physics; *Quantum Mechanical Studies on Molecular Structure;* 3 years; $143,400.

CLEMSON AGRICULTURAL COLLEGE, Clemson, S. C.; J. E. Miller, Department of Physics; *A Study of Sulphur;* 2 years; $12,000.

UNIVERSITY OF COLORADO, Boulder, Colo.; M. Mizushima, Department of Physics; *Microwave Spectroscopy;* 1 year; $12,400.

COLUMBIA UNIVERSITY, New York, N. Y.; P. Kusch, Department of Physics; *Hyperfine Structure of Ionized Helium Three and the Hydrogen Molecular Ion;* 2 years; $31,700.

CORNELL UNIVERSITY, Ithaca, N. Y.; K. I. Greisen, Department of Physics; *Cosmic Ray Particle and Shower Study;* 2 years; $48,900.

CORNELL UNIVERSITY, Ithaca, N. Y.; R. L. Sproull, Department of Physics; *Phonon Scattering in Solids;* 3 years; $25,600.

DEPAUW UNIVERSITY, Greencastle, Ind.; Malcolm Correll, Department of Physics; *Solar Prominence Magnetic Fields,* 3 years; $12,000.

DUKE UNIVERSITY, Durham, N. C.; William M. Fairbank, Department of Physics; *Theoretical and Experimental Investigations of Quantum Liquids;* 2 years; $30,100.

DUKE UNIVERSITY, Durham, N. C.; H. Sponer, Department of Physics; *Electronic Structure of Molecules;* 2 years; $23,800.

GEORGETOWN UNIVERSITY, Washington, D. C.; R. L. Mooney, Department of Physics; *Hyperfine Structure in the Microwave Spectra of Polyatomic Molecules;* 2 years; $10,100.

GOUCHER COLLEGE, Baltimore, Md.; John I. Lodge, Department of Physics; *Interactions of Strange Particles;* 2 years; $8,900.

HAVERFORD COLLEGE, Haverford, Pa.; Fay Ajzenberg-Selove, Department of Physics; *Neutron Spectra and Energy Levels;* 3 years; $30,700.

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Forrest F. Cleveland, Department of Physics; *Vibrational Spectra of Polyatomic Molecules;* 2 years; $16,600.

INDIANA UNIVERSITY, Bloomington, Ind.; E. J. Konopinski, Department of Physics; *Elementary Particle Interactions;* 2 years; $55,200.

INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; J. Robert Oppenheimer, Director; *Fundamental Theory of Particles and Fields;* 1 year; $20,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; G. H. Dieke, Department of Physics; *Spectroscopy of Rare Earths at Low Temperatures;* 1 year; $4,700.

KANSAS STATE COLLEGE, Manhattan, Kans.; A. B. Cardwell, Department of Physics; *Photoelectric Properties of Uranium Metal;* 2 years; $11,500.

UNIVERSITY OF KANSAS, Lawrence, Kans.; L. W. Seagondollar, Department of Physics; *Excited Levels of Low Mass Nuclei;* 2 years; $23,300.

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; D. M. Bennett, Department of Physics; *Autoradiographic Studies Using Gamma Emitting Isotopes;* 2 years; $6,600.

MANHATTAN COLLEGE, New York, N. Y.; Brother Gabriel Kane, Department of Physics; *Interactions and Flux of Primary Cosmic Rays;* 2 years; $3,400.

UNIVERSITY OF MARYLAND, College Park, Md.; Joseph Weber, Institute of Fluid Dynamics and Applied Mathematics; *Research in General Relativity;* 2 years; $7,700.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Manson Benedict, Department of Physics; *The Establishment of a Research Reactor Facility;* 2 years; $500,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; B. B. Rossi, Laboratory for Nuclear Sciences; *Air Shower Cosmic Ray Research;* 2 years; $48,300.

MICHIGAN STATE UNIVERSITY, East Lansing, Mich.; W. H. Tanttila and J. A. Cowen, Department of Physics; *Interactions of Lattice Vibrations with Nuclei, Electrons, and Holes;* 2 years; $21,000.

MIDDLEBURY COLLEGE, Middlebury, Vt.; Chung-Ying Chih, Department of Physics; *Emulsion Studies of K Mesons, Hyperons and Hyperfragments;* 2 years; $6,300.

UNIVERSITY OF MISSOURI, Columbia, Mo.; Paul W. Schmidt, Department of Physics; *Small Angle X-ray Scattering;* 2 years; $15,300.

MONTANA STATE UNIVERSITY, Missoula, Mont.; M. J. Jakobson, Department of Physics; *Photoneutron Cross-Sections;* 2 years; $19,200.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; J. H. Roberts, Department of Physics; *Hyperfragments in Nuclear Emulsions Exposed to High Energy Particles;* 2 years; $24,800.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Stephen M. Shafroth, Department of Physics; *Gamma Ray Studies of Nuclear States;* 2 years; $16,600.

OHIO UNIVERSITY, Athens, Ohio; C. A. Randall, Department of Physics; *Emulsion Investigations of Primary Cosmic Rays;* 2 years; $17,500.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; K. R. Atkins, Department of Physics; *Liquid Helium;* 2 *years;* $25,100.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; R. G. Cochran and W. W. Pratt, Department of Physics; *Short-Lived Radioisotopes Employing a Continuous-Flow Activation System;* 2 years; $17,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; K. A. Brueckner, Department of Physics; *Theory of Many-Body Systems;* 2 years; $37,700.

UNIVERITY OF PENNSYLVANIA, Philadelphia, Pa.; S. Frankel, Department of Physics; *Low Energy Nuclear Spectroscopy;* 2 years; $21,800.

RICE INSTITUTE, Houston, Tex.; C. F. Squire, Department of Physics; *Low Temperature Physics;* 2 years; $26,400.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; M. P. Givens, Institute of Optics; *Optical Constants of Metals;* 1 year; $7,700.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; J. R. Holmes, Department of Physics; *Optical Properties of Evaporated Films of Ferromagnetic Metals;* 2 years; $15,600.

SWARTHMORE COLLEGE, Swarthmore, Pa.; Dennison Bancroft, Department of Physics; *Velocity of Sound in Gases;* 2 years; $15,000.

SYRACUSE UNIVERSITY, Syracuse, N. Y.; Richard L. Arnowitt, Department of Physics; *Theory of Elementary Particles;* 2 years; $13,100.

ST. BONAVENTURE UNIVERSITY, St. Bonaventure, N. Y.; Zachary O'Friel, Department of Physics; *Heavy Primaries in Cosmic Radiation;* 2 years; $6,600.

UNIVERSITY OF UTAH, Salt Lake City, Utah; J. W. Keuffel, Department of Physics; *Study of Cosmic Ray Mesons;* 3 years; $45,100.

VANDERBILT UNIVERSITY, Nashville, Tenn.; Sherwood K. Haynes, Department of Physics; *Beta-Ray Spectroscopy at Very Low Energies;* 2 years; $22,000.

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; A. D. Crowell, Department of Physics; *Adsorption on Metals Using Radioactive Tracers;* 2 years; $15,000.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; J. W. Beams, Department of Physics; *Low Temperature and Solid State Physics;* 2 years; $8,200.

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; D. E. Moe, Department of Physics; *Energy Spectrum of Electrons Emitted From Gases Bombarded by Positive Ions;* 2 years; $15,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; R. C. Herb, Department of Physics; *Development of High Voltage Electrostatic Generators for Nuclear Physics Research;* 2 years; $120,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; K. M. Watson and H. W. Lewis, Department of Physics; *Theory of Conductivity and Many-Particle Problems in Quantum Mechanics;* 2 years; $30,000.

YALE UNIVERSITY, New Haven, Conn.; V. W. Hughes, Department of Physics; *Beam Resonance Experiments on Helium and Structure of Positronium;* 3 years; $54,000.

YALE UNIVERSITY, New Haven, Conn.; C. T. Lane, Department of Physics; *Dynamics of Liquid Helium;* 3 years; $53,600.

Psychobiology

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; T. C. Schneirla, Department of Animal Behavior; *Biological Basis of Behavior in Neivamyrmex;* 3 years; $16,900.

BROWN UNIVERSITY, Providence, R. I.; J. W. Kling, Department of Psychology; *Factors Influencing Response Strength;* 1 year; $3,900.

BUCKNELL UNIVERSITY, Lewisburg, Pa.; Harry L. Jacobs, Department of Psychology; *Psychophysiology of Hunger;* 2 years; $4,500.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Roger W. Sperry, Division of Biology; *Neural Mechanisms of Behavior;* 3 years; $72,600.

CLEVELAND HEARING AND SPEECH CENTER, Cleveland, Ohio; Earl D. Schubert; *Role of Binaural Time Differences in Reception of Speech;* 1 year; $3,200.

COLUMBIA UNIVERSITY, New York, N. Y.; William N. Schoenfeld and William W. Cumming, Department of Psychology; *Research on Schedules of Reinforcement;* 2 years; $21,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; Donald G. Forgays and Harry Levin, Department of Psychology; *Learning as a Function of Stimulus Change;* 16 months; $6,300.

EARLHAM COLLEGE, Richmond, Ind.; John A. Barlow, Department of Psychology; *Studies of Secondary Motivation;* 3 years; $8,000.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Lloyd M. Beidler, Department of Physiology; *Research on Chemoreception;* 3 years; $25,000.

GEORGE PEABODY COLLEGE FOR TEACHERS, Nashville, Tenn.; Joan H. Cantor, Department of Psychology; *Variables Influencing Stimulus Predifferentiation;* 1 year; $4,700.

GRINNELL COLLEGE, Grinnell, Iowa; Irving Y. Fishman, Department of Biology; *Research on Chemoreception;* 3 years; $14,600.

HARVARD UNIVERSITY, Cambridge, Mass.; Sarnoff A. Mednick, Department of Social Relations; *Studies in Stimulus Generalization;* 1 year; $7,100.

HARVARD UNIVERSITY, Cambridge, Mass.; B. F. Skinner, Department of Psychology; *Research on Reinforcement Schedules;* 1 year; $4,000.

HARVARD UNIVERSITY, Cambridge, Mass.; B. F. Skinner, Department of Psychology; *Research on Reinforcement Schedules;* 2 years; $45,300.

HARVARD UNIVERSITY, Cambridge, Mass.; S. Smith Stevens, Psychological Laboratory; *Psychophysical Scaling;* 3 years; $55,300.

ILLINOIS COLLEGE, Jacksonville, Ill.; Nicholas E. Collias, Department of Biology; *Behavior in Ploceidae;* 1 year; $1,900.

INDIANA UNIVERSITY, Bloomington, Ind.; James A. Dinsmoor, Department of Psychology; *Studies on Instrumental Conditioning;* 2 years; $10,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Edward F. MacNichol, Jr., Department of Biophysics; *Visual Research;* 3 years; $19,100.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Charles D. Michener, Department of Entomology; *Origin and Evolution of Caste Behavior Among Certain Bees;* 3 years; $23,300.

KENT STATE UNIVERSITY, Kent, Ohio; Charles C. Perkins, Department of Psychology and Emanuel C. Hertzler, Department of Biology; *Role of Reinforcement in Conditioning;* 1 year; $4,500.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Clyde E. Noble, Department of Psychology; *Analysis of Trial-and-Error Learning;* 3 years; $22,200.

UNIVERSITY OF MARYLAND, College Park, Md.; Henricus G. Kuypers, Department of Anatomy, School of Medicine; *Research on the Brain Stem Reticular Formation;* 2 years; $10,400.

UNIVERSITY OF MARYLAND, College Park, Md.; Howard E. Winn, Department of Zoology; *Behavior of Pisces-Percidae;* 3 years; $8,300.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; Abram M. Barch, Department of Psychology; *Perceptual-Motor Learning;* 2 years; $10,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; John E. Bardach, Department of Fisheries; *Behavior of Reef Fish;* 1 year; $5,100.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Eugene S. Gollin, Institute of Child Welfare; *Development of Visual and Tactual Recognition;* 2 years; $14,800.

MOUNT HOLYOKE COLLEGE, South Hadley, Mass.; John Volkmann, Department of Psychology; *Research in Visual Perception;* 1 year; $5,000.

UNIVERSITY OF NEVADA, Reno, Nev.; Paul F. Secord, Department of Psychology; *Research Training in Experimental Psychology;* 2 years; $6,800.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; George M. Peterson, Department of Psychology; *Neurophysiology of Behavior;* 2 years; $13,400.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; John W. Cotton and Donald J. Lewis, Department of Psychology; *Experimental Investigation of Extinction;* 3 years; $22,900.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Brendan A. Maher, Department of Psychology; *Frontal Area Function in Lower Animals;* 15 months; $5,800.

OHIO STATE UNIVERSITY, Columbus, Ohio; Jay M. Enoch, School of Optometry; *Amblyopia and the "Stiles-Crawford Effect";* 1 year; $5,100.

UNIVERSITY OF OKLAHOMA, Norman, Okla.; Charles C. Carpenter, Department of Zoology; *Ethnological Studies of Reptiles;* 3 years; $14,200.

PRINCETON UNIVERSITY, Princeton, N. J.; Byron A. Campbell, Department of Psychology; *Methodological Study of the Aversive Properties of Stimuli;* 1 year; $6,200.

PRINCETON UNIVERSITY, Princeton, N. J.; Harold Gulliksen, Department of Psychology; *Mathematical Techniques in Psychology;* 5 years; $40,300.

PRINCETON UNIVERSITY, Princeton, N. J.; William M. Smith, Department of Psychology; *Visual Contour Processes;* 1 year; $7,700.

SOUTHERN ILLINOIS UNIVERSITY, Carbondale, Ill.; Israel Goldiamond, Department of Psychology; *Development of Psychophysical Techniques;* 1 year; $7,200.

STANFORD UNIVERSITY, Stanford, Calif.; John M. Warren, Department of Psychology; *Learning in Submammalian Organisms;* 2 years; $9,500.

SWARTHMORE COLLEGE, Swarthmore, Pa.; Solomon E. Asch, Department of Psychology; *Studies in Cognition;* 3 years; $27,300.

TEXAS TECHNOLOGICAL COLLEGE, Lubbock, Tex.; A. Clinton Pereboom, Department of Psychology; *Role of Exploratory Drive in Learning;* 1 year; $1,800.

UNIVERSITY OF TEXAS, Austin, Tex.; Harold W. Stevenson, Department of Psychology; *Discrimination Learning;* 2 years; $9,900.

TRINITY UNIVERSITY, San Antonio, Tex.; Eugene A. Craig, Department of Psychology; *Research on Visual Processes;* 1 year; $7,600.

TUFTS UNIVERSITY, Medford, Mass.; Paul D. Coleman, Department of Psychology; *Study of Auditory Localization;* 1 year; $7,500.

VASSAR COLLEGE, Poughkeepsie, N. Y.; Eric G. Heinemann, Department of Psychology; *Simultaneous Brightness Induction in Human Vision;* 2 years; $12,500.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Carl E. Scherric, Jr., Department of Psychology; *Psychophysical Parameters of Vibratory Perception;* 2 years; $10,500.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Moncrieff H. Smith, Jr., Department of Psychology; *Aspects of Biological Motivation;* 2 years; $11,400.

WESLEYAN UNIVERSITY, Middletown, Conn.; William R. Thompson, Department of Psychology; *Influence of Stress on Behavior;* 2 years; $9,400.

UNIVERSITY OF WISCONSIN, Madison, Wis.; John T. Emlen, Jr., Department of Zoology; *Origin and Development of Basic Behavior Patterns;* 3 years; $17,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; David A. Grant, Department of Psychology; *Studies in Eyelid Conditioning;* 3 years; $25,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Arthur D. Hasler, Department of Zoology; *Environmental Influences on Fish Behavior;* 3 years; $28,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Herschel W. Leibowitz, Department of Psychology; *Studies of Perceptual Constancy;* 1 year; $5,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Willard R. Thurlow, Department of Psychology; *Studies of Auditory Pattern Formation;* 3 years; $17,700.

UNIVERSITY OF WYOMING, Laramie, Wyo.; Margaret Altmann, Jackson Hole Biological Research Station; *Behavior Patterns in Wild Ungulates;* 1 year; $9,100.

YALE UNIVERSITY, New Haven, Conn.; Lawrence Stark, Section of Neurology, Yale School of Medicine; *Servo-Analysis of the Pupillary Reflex;* 3 years; $16,800.

Regulatory Biology

ALABAMA POLYTECHNIC INSTITUTE, Auburn, Ala.; H. E. Sauberlich, Department of Animal Husbandry and Nutrition; *Role of B Vitamins in Biosynthetic Pathways of Micho-Organisms;* 3 years; $18,500.

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Joseph T. Bagnara, Department of Zoology; *Endocrine Control of Pigmentation in Amphibia;* 2 years; $7,000.

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Dorothy E. Bliss, Department of Fishes and Aquatic Biology; *Neurosecretory Control of Growth and Locomotor Activity in Gecarcinus Lateralis;* 3 years; $15,700.

BROOKLYN BOTANIC GARDEN, Brooklyn, N. Y.; Paul R. Burkholder, Director of Research; *Obligate and Facultative Photoautotrophy in the Genus Chlamydomonas;* 1 year; $4,650.

BROWN UNIVERSITY, Providence, R. I.; Paul F. Fenton, Department of Biology; *Inherited Metabolic and Endocrine Patterns of the Mouse;* 3 years; $11,550.

BRYN MAWR COLLEGE, Bryn Mawr, Pa.; L. Joe Berry, Department of Biology; *Metabolic Factors Related to Susceptibility to Bacterial Infection in Mice;* 2 years; $10,900.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; A. van Harreveld, Division of Biology; *Nature and Mechanism of Asphyxial Potentials;* 2 years; $18,400.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Geoffrey Keighley, Division of Biology; *Factors Regulating Production of Hemoglobin and Red Cells;* 3 years; $27,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Michael Doudoroff, Department of Bacteriology; *The Biosynthesis and Function of Photosynthetic Bacterial Pigments;* 3 years; $26,300.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Ralph H. Kellogg and Nello Pace, Department of Physiology; *Respiratory Adjustments During Exercise and Prolonged Hypoxia;* 15 months; $27,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Wilbur B. Quay, Department of Zoology; *Functional Significance of the Mammalian Pineal Organ;* 2 years; $15,700.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Wilbur B. Quay, Department of Zoology; *Structure and Function of the Mammalian Pineal Body;* 18 months; $5,800.

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;* 2 years; $10,400.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Yoshinori Tanada, Department of Biological Control; *Synergism Among Insect Viruses;* 18 months; $6,800.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Morton I. Grossman, Department of Medicine, Los Angeles, Calif.; *Factors Related to Exocrine Secretory Function of the Pancreas;* 3 years; $23,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Bernard O. Phinney, Department of Botany and Charles A. West, Department of Chemistry, Los Angeles, Calif.; *Genetical and Biochemical Studies on Gibberellins in Higher Plants;* 3 years; $35,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Robert D. Tschirgi, School of Medicine, Los Angeles, Calif.; *Electrolyte Exchange Between Plasma and Extravascular Fluids of the Central Nervous System;* 2 years; $30,100.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Barbara B. Oakeson, Department of Biological Sciences, Santa Barbara College; *Histologic Cycle of the Thyroid in Sparrows;* 1 year; $2,600.

CHARING CROSS HOSPITAL, London, England; Alfred L. Copley, Director of Experimental Research on Vascular Diseases; *Role of Endothelium in Fibrin Formation, Platelet Agglutination and Production of Vascular Purpura;* 18 months; $6,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; E. S. Guzman Barron, Department of Medicine; *Pathways of Glucose and Pentose Oxidation and Terminal Pathways of Respiration in Molds;* 1 year; $5,750.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Lawrence Bogorad and Wayne McIlrath, Department of Botany; *Physiology of Floral Induction and Flowering;* 3 years; $23,350.

UNIVERSITY OF COLORADO, Boulder, Colo.; Alfred S. Crowle, Department of Microbiology, School of Medicine, Denver, Colo.; *The Mechanism of Acquired Immunity to Tuberculosis;* 3 years; $21,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; Richard H. Barnes, School of Nutrition; *Role of Intestinal Microflora in the Nutrition of the Host Animal;* 3 years; $26,200.

CORNELL UNIVERSITY, Ithaca, N. Y.; Donald B. Melville, Cornell University Medical College; *Significance of Ergothioneine in Mammalian Metabolism;* 3 years; $37,550.

CORNELL UNIVERSITY, Ithaca, N. Y.; Jean Paul Mitsch, Department of Floriculture and Ornamental Horticulture; *Regulation of Growth of Woody Plants;* 3 years; $24,050.

CORNELL UNIVERSITY, Ithaca, N. Y.; Lemuel D. Wright, School of Nutrition; *Metabolism and Biological Role of Mevalonic Acid;* 5 years; $43,500.

DUKE UNIVERSITY, Durham, N. C.; Terry W. Johnson, Department of Botany; *The Nutrition and Metabolism of Lignicolous Marine Fungi;* 3 years; $13,600.

DUKE UNIVERSITY, Durham, N. C.; Knut Schmidt-Nielsen, Department of Zoology; *Factors in the Rates of Oxygen Supply to Tissues;* 2 years; $22,500.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Dexter M. Easton, Division of Physiology; *Inhibition and Trans-Membrane Potentials in Crustacean Muscle Fibers;* 2 years; $9,200.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Ernest B. Wright, Department of Physiology; *Excitation and Conduction in Nerve;* 3 years; $22,600.

GEORGE WASHINGTON CARVER FOUNDATION, Tuskegee Institute, Ala.; James H. M . Henderson, Department of Biology, Tuskegee Institute; *Mechanism of Action of Plant Growth Regulators;* 3 years; $13,250.

UNIVERSITY OF GEORGIA, Athens, Ga.; William J. Payne, Department of Bacteriology; *Culture and Metabolism of Marine Bacteria;* 2 years; $7,000.

HAHNEMANN MEDICAL COLLEGE, Philadelphia, Pa.; William L. Gaby, Division of Microbiology; *Mechanisms of Inhibition of Antibody Formation;* 2 years; $10,700.

HAHNEMANN MEDICAL COLLEGE, Philadelphia, Pa.; Albert C. Moat, Department of Microbiology; *Role of Biotin in the Metabolism of Yeast;* 2 years; $9,000.

HARVARD UNIVERSITY, Cambridge, Mass.; Luigi Gorini and Bernard D. Davis, Department of Microbiology, School of Medicine; *Synthesis and Secretion of Bacterial Exocellular Proteinases;* 30 months; $42,200.

HARVARD UNIVERSITY, Cambridge, Mass.; Paul L. Munson, Harvard School of Dental Medicine; *Interrelationships of the Adrenal Cortex, Anterior Pituitary, and Hypothalamus;* 3 years; $35,200.

HARVARD UNIVERSITY, Cambridge, Mass.; Ralph H. Wetmore and Kenneth V. Thimann, Biological Laboratories; *Analysis of Growth and Differentiation in Plants;* 3 years; $39,000.

HAVERFORD COLLEGE, Haverford, Pa.; Melvin Santer, Department of Biology; *Energy Metabolism and Carbon Assimilation in Autotrophic Bacteria;* 3 years; $6,400.

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; William Danforth, Department of Biology; *Cellular Permeability and Metabolic Regulation;* 2 years; $11,550.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Ralph D. DeMoss, Department of Bacteriology; *Bacterial Pigments;* 1 year; $4,800.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; John B. Hanson, Department of Agronomy, College of Agriculture; *Effect of Plant Growth Regulators on Metabolic Activities of Subcellular Particles From Plant Tissues;* 2 years; $13,300.

INDIANA UNIVERSITY, Bloomington, Ind.; Eugene D. Weinberg, Department of Bacteriology; *Mutual Effects of Metallic Ions and Antimicrobial Compounds;* 2 years; $7,800.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Carl Lamanna, Department of Microbiology; *Cessation of Growth of Bacteria at Minimum Temperatures;* 2 years; $5,950.

UNIVERSITY OF KANSAS, Lawrence, Kans.; David G. Fleming, Department of Physiology; *Regulation of Food Intake in Parabiotic Rats;* 2 years; $13,800.

LOS ANGELES STATE COLLEGE OF APPLIED ARTS AND SCIENCES, Los Angeles, Calif.; Anthony J. Andreoli, Division of Natural Sciences; *Bacterial Oxidation of Aliphatic Aldehydes;* 2 years; $8,500.

UNIVERSITY OF MAINE, Orono, Maine; Harold W. Gausman, Department of Agronomy, Agricultural Experiment Station; *Function of Chloride in Potato Nutrition;* 2 years; $7,300.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Morris Rockstein, Department of Physiology; *Mechanisms of Orientation to Light by Starfish;* 2 years; $5,200.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Charles G. Wilber; *Cardiovascular Physiology in Fish;* 3 years; $3,450.

MARYMOUNT COLLEGE, Salina, Kans.; Sister Crescentia Giersch, Rose Waller Research Laboratory; *Effect of Amino Acids Upon the Nutrition of Stichococcus Bacillaris;* 2 years; $2,600.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Edward Herbert, Department of Biology; *Synthesis of Ribonucleic Acid in Cell-Free Systems;* 2 years; $10,700.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Warren S. McCulloch, Research Laboratory of Electronics; *Transmission of Signals Across the Central Nervous System;* 2 years; $28,400.

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Henry N. Little, Department of Chemistry; *Effect of Amino-Triazole on Higher Plants and Other Organisms;* 2 years; $10,750.

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; John G. Moner, Department of Zoology; *The Nature and Action of Substances Which Stimulate Cell Division;* 3 years; $16,000.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich; Edward C. Cantino, Department of Botany and Plant Pathology; *Metabolic and Morphogenetic Relationships and Light Induced Growth in Fungi;* 30 months; $12,500.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Alfred S. Sussman, Department of Botany; *Dormancy in Ascospores of Neurospora;* 2 years; $10,000.

UNIVERSITY OF MISSOURI, Columbia, Mo.; Boyd L. O'Dell, Department of Agriculture; *Unidentified Nutrients Required by the Guinea Pig;* 2 years; $10,000.

NEW ENGLAND INSTITUTE FOR MEDICAL RESEARCH, Ridgefield, Conn.; John H. Heller, Director; *Role of the Reticuloendothelial System in the Metabolism of Certain Proteins;* 2 years; $12,100.

NEW YORK UNIVERSITY, New York, N. Y.; Isidor Greenwald, Department of Biological Chemistry; *Thyriod Function From Historical Data;* 2 years; $5,400.

NEW YORK UNIVERSITY, New York, N. Y.; Alwin M. Pappenheimer, Jr., Department of Microbiology, Bellevue Medical Center; *The Mode of Action of Diphtheria Toxin;* 3 years; $60,200.

NEW YORK ZOOLOGICAL SOCIETY, New York, N. Y.; Thomas Goreau, University College of the West Indies, Mona, Jamaica; *Physiology of Reef Building Corals;* 2 years; $17,750.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; David P. Earle, Department of Medicine, Chicago, Ill.; In Vivo *Role of Complement;* 2 years; $12,400.

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Albert Wolfson, Department of Biological Sciences; *Metabolic and Endocrine Factors in the Regulation of Bird Migration;* 3 years; $26,600.

OHIO UNIVERSITY, Athens, Ohio; Charles H. Southwick, Department of Zoology; *Adrenal Responses of Rodents to Behavioral Stress;* 2 years; $5,650.

UNIVERSITY OF OREGON, Eugene, Oreg.; Jacob Straus, Department of Biology; *Biosynthesis of Anthocyanin in Corn Endosperm Tissue Cultures;* 3 years; $17,200.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Harry E. Morton and Paul F. Smith, Department of Microbiology; *Nutrition and Metabolism of the Pleuropneumonia-Like Group of Organisms;* 2 years; $13,500.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Alex Shrift, Department of Botany; *Role of Sulfur-Containing Amino Acids in Cell Division;* 2 years; $11,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; George F. Springer, Pepper Laboratory of Clinical Medicine; *Nature of Blood Group Active Substances From Bacteria and Higher Plants;* 3 years; $20,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Merwin Moskowitz, Department of Biological Sciences, Purdue University; *Propagation of Macrophages in Tissue Culture;* 3 years; $21,500.

QUEEN'S UNIVERSITY, Kingston, Ontario, Canada; H. Arliss Denyes, Department of Zoology; *Function of Cortical Tubular Cells in Acclimation and Hibernation;* 1 year; $3,200.

RICE INSTITUTE, Houston, Tex.; Jack W. Daugherty, Department of Biology; *The Role of the Hepatopancreas of the Snail in Metabolic Processes;* 2 years; $13,600.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; E. F. Adolph, Department of Physiology; *Development of Regulatory Mechanisms in Individual Animals;* 3 years; $24,000.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; E. S. Nasset, Department of Physiology; *Influence of the Thyroid Gland on the Secretion of Gastric Juice;* 3 years; $34,500.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Hans Fisher, Department of Poultry Husbandry; *Amino Acid Requirements for Growth and Egg Production;* 3 years; $22,500.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; James C. Hall, Division of Natural Sciences, Newark College of Arts and Sciences; *Effect of Insulin on Carbohydrate Oxidation by Mitochondrial Preparations;* 2 years; $12,150.

SCRIPPS CLINIC AND RESEARCH FOUNDATION, La Jolla, Calif.; Henry I. Nakada, Division of Laboratories; *Metabolism of Glyoxylic Acid by Mammalian Tissues;* 2 years; $8,050.

SMITHSONIAN INSTITUTION, Washington, D. C.; Robert B. Withrow, Astrophysical Observatory; *Photoregulation of Growth in Plants;* 3 years; $27,000.

UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; Alworth D. Larson, Department of Microbiology and Public Health; *Factors Involved in the Utilization of Valine Isomers by Bacteria;* 1 year; $3,000.

STANFORD UNIVERSITY, Stanford, Calif.; Winslow R. Briggs, Department of Biological Sciences; *Growth Limiting Factors in Ferns;* 3 years; $9,150.

STANFORD UNIVERSITY, Stanford, Calif.; O. H. Robertson, Department of Biology; *Relation of Increased Endocrine Activity to Post-Spawning Degenerative Changes in Fishes;* 3 years; $5,400.

STANFORD UNIVERSITY, Stanford, Calif.; Philip E. Smith, Department of Anatomy; *Influence of the Hypophysis on Endometrial Response to Estrogen;* 2 years; $9,900.

SYRACUSE UNIVERSITY, Syracuse, N. Y.; Verner J. Wulff and Donald A. Kennedy, Department of Zoology; *Light Initiated Photo-Chemical Events in the Visual Process;* 3 years; $27,900.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Friedrich P. J. Diecke, Department of Physiology, Memphis, Tenn.; *Olfactory Sense in Mammals;* 3 years; $17,900.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; D. Frank Holtman, Department of Bacteriology; *Role of Amino Acids in the Host-Parasite Relationship;* 2 years; $10,500.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Samuel R. Tipton, Department of Zoology and Entomology; *The Role of Thyroidal and Adrenocortical Hormones in Certain Enzymatic Activities;* 2 years; $10,300.

TEXAS AGRICULTURAL AND MECHANICAL COLLEGE SYSTEM, College Station, Tex.; Samuel P. Johnson, Department of Plant Physiology and Pathology; *Effect of Red and Far Red Light on Growth and Development of Plants;* 2 years; $2,100.

TEXAS AGRICULTURAL EXPERIMENT STATION, College Station, Tex.; James L. Liverman, Department of Biochemistry and Nutrition; *Metabolic Interrelationships of the Photoperiodic Response in Plants;* 3 years; $32,100.

UNIVERSITY OF TEXAS, Austin, Tex.; J. Allen Scott and Etta Mae Macdonald, Medical Branch, Galveston, Texas; *Nature of Racial or Species Immunity;* 3 years; $24,200.

UNIVERSITY OF UTAH, Salt Lake City, Utah; Alan K. Done, Department of Pediatrics; *Role of Ascorbic Acid in Adrenal Cortical Function;* 3 years; $23,650.

VANDERBILT UNIVERSITY, Nashville, Tenn.; Jane H. Park, Department of Physiology, School of Medicine; *Mechanisms of Hormonal Regulation of Oxidative Phosphorylation;* 2 years; $13,100.

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Calvin Hanna, Department of Pharmacology, School of Medicine; *Nature of Tachyphylaxis;* 3 years; $16,000.

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Thomas Sproston, Jr., Department of Botany; *Production of the Fruiting Bodies in Sclerotinia Trifoliorum;* 2 years; $5,500.

WABASH COLLEGE, Crawfordsville, Ind.; Willis H. Johnson, Department of Biology; *Nutritive Requirements of Paramecium Multimicronucleatum for Growth in Sterile Culture;* 2 years; $5,300.

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; N. Higinbotham, Department of Botany; *Interaction of Auxin and Salts in Rubidium Uptake by Excised Plant Tissue;* 1 year; $8,000.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Arthur W. Martin and David Duane Chapman, Department of Zoology; *Copper Metabolism in Molluscs;* 2 years; $3,800.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Richard B. Walker, Department of Botany; *Mineral Nutrition of Plants Endemic to Serpentine Soils;* 3 years; $8,200.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Roy R. Peterson, Department of Anatomy; *Cytology of the Adenohypophysis;* 2 years; $10,000.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Theodor Rosebury, Department of Bacteriology; *Interactions of Microorganisms Indigenous to Man;* 1 year; $10,000.

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; Stanley F. Patten, Jr., Department of Anatomy, School of Medicine; *Fate of the Lymphocyte;* 2 years; $9,600.

UNIVERSITY OF WISCONSIN, Madison, Wis.; George W. Keitt, Department of Plant Pathology; *Nature of Parasitism and Disease Resistance;* 3 years; $19,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Dexter S. Goldman, John W. Porter, and Alfonso B. Falcone, Institute of Enzyme Research, Department of Physiological Chemistry and Department of Medicine; *Recording Spectrophotometer for Biological Research;* 2 years; $8,500.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Stanley G. Knight, Department of Bacteriology; *Metabolism of Filamentous Fungi with Special Reference to Penicillium Chrysogenum;* 3 years; $16,100.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Henry A. Lardy, Institute for Enzyme Research; *Respiration and Oxidative Phosphorylation of Brain Mitochondria;* 2 years; $11,500.

UNIVERSITY OF WISCONSIN, Madison, Wis.; W. H. McShan and Roland K. Meyer, Department of Zoology; *Production and Mechanism of Release of Gonadotrophin and ACTH From Horse and Rat Pituitary Glands;* 3 years; $29,600.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Peter R. Moore, Department of Pharmacology, The Medical School; *Multiple Nature of Alkaline Phosphatase;* 3 years; $20,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; F. M. Strong, Department of Biochemistry; *Chemistry and Metabolism of Biologically Active Substances;* 5 years; $39,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Duard L. Walker, Department of Medical Microbiology; *Multiplication of Mutant Viral Strains;* 2 years; $23,200.

UNIVERSITY OF WISCONSIN, Madison, Wis.; P. W. Wilson and R. H. Burris, Department of Biochemistry; *Biological Fixation of Nitrogen;* 3 years; $28,300.

WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY, Shrewsbury, Mass.; Oscar Hechter; *Influence of Insulin and Other Factors on the Sugar-Transfer Mechanism in Muscle;* 3 years; $31,800.

YALE UNIVERSITY, New Haven, Conn.; Arthur W. Galston, Department of Plant Science; *Light-Controlled Growth Reactions in Plants;* 18 months; $7,600.

YALE UNIVERSITY, New Haven, Conn.; Alexander Mauro, Department of Physiology; *Electrophysiological Study of the Knife Fishes;* 3 years; $15,100.

YALE UNIVERSITY, New Haven, Conn.; Leonard M. Passano, Department of Zoology; *Sensory Integration in Lower Invertebrates;* 3 years; $19,150.

YALE UNIVERSITY, New Haven, Conn.; Grace E. Pickford, The Bingham Oceanographic Laboratory; *Endocrine Regulation of Metabolic Functions in Teleost Fishes;* 3 years; $20,700.

YALE UNIVERSITY, New Haven, Conn.; Wolf Vishniac, Department of Microbiology; *Enzymatic Reactions in Photosynthesis and Chemosynthesis;* 3 years; $16,300.

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Sociophysical Sciences

UNIVERSITY OF ALABAMA, University, Ala.; Benjamin C. Moffett, Jr., Department of Anatomy, Medical Center; Birmingham, Ala.; *Early History of Arthrology;* 1 year; $1,900.

AMERICAN ACADEMY OF ARTS AND SCIENCES, Boston, Mass.; Philipp G. Frank, Department of Physics; *Acceptance of Scientific Theories;* 1 year; $10,650.

ANTIOCH COLLEGE, Yellow Springs, Ohio; Julian Blau, Department of Mathematics; *Balanced Tables and Functions in Mathematical Economics;* 1 year; $10,000.

COLUMBIA UNIVERSITY, New York, N. Y.; R. Duncan Luce, Bureau of Applied Social Research; *Mathematics of Imperfect Discrimination;* 2 years; $12,900.

CORNELL UNIVERSITY, Ithaca, N. Y.; Howard B. Adelmann, Department of Zoology; *Evolution of Embryology;* 3 years; $24,150.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Robert E. Schofield, Department of History; *Scientific Research in Eighteenth Century England;* 3 years; $6,300.

LEHIGH UNIVERSITY, Bethlehem, Pa.; Adolph Grunbaum, Department of Philosophy; *Philosophy of Fundamental Physical Theory;* 2 years; $5,200.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Dorwin Cartwright, Research Center for Group Dynamics; *Information and Cognition in the Communication Process;* 2 years; $16,300.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Herbert Feigl, Minnesota Center for Philosophy of Science; *Philosophical Foundations of Physics and the Comparative Methodology of Science;* 2 years; $21,800.

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC., New York, N. Y.; Geoffrey H. Moore and Julius Shiskin, Department of Physics; *Application of Electronic Computers to the Analysis of Economic Statistics;* 2 years; $27,200.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Ernan McMullin, Department of Philosophy; *Implications of the Quantum Principle of Uncertainty;* 1 year; $3,400.

YALE UNIVERSITY, New Haven, Conn.; Robert Summers, Cowles Foundation for Research in Economics; *A Sampling Experiment Investigation of Alternative Procedures for Parameter Estimation;* 2 years; $14,300.

Systematic Biology

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Mont A. Cazier, Department of Insects and Spiders; *Revision of the Genus Diplotaxis;* 1 year; $3,500.

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.; Albert Schwartz, Department of Amphibians and Reptiles; *Systematics and Zoogeography of the Genus Eleutherodactylus;* 2 years; $6,200.

AMHERST COLLEGE, Amherst, Mass.; Albert E. Wood, Department of Biology; *Evolution of the Paramyidae;* 1 year; $3,000.

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Charles T. Mason, Jr., The Herbarium; *Inter-Relationships of the Western North American Gentians;* 3 years; $2,500.

BERNICE P. BISHOP MUSEUM, Honolulu, T. H.; R. H. van Zwaluwenberg, Honorary Associate in Entomology; *Elateridae of Oceania and New Guinea;* 1 year; $8,000.

BOSTON UNIVERSITY, Boston, Mass.; Arthur G. Humes, Department of Biology; *Copepoda (Crustacae) of Africa and Madagascar;* 2 years; $5,000.

BROWN UNIVERSITY, Providence, R. I.; George L. Church, Department of Botany; *Origin of Species Complexes in the Grass Genus Elymus;* 2 years; $3,400.

CALIFORNIA ACADEMY OF SCIENCES, San Francisco, Calif.; Edward S. Ross, Department of Entomology; *A Monograph of the Insect Order Embioptera;* 1 year; $6,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Paul R. Needham, Department of Zoology; *Systematics of Salmo Gairdneri;* 1 year; $2,100.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; George F. Papenfuss, Department of Botany; *Marine Algal Flora of South Africa;* 3 years; $15,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Louis K. Mann, Experiment Station, Davis, Calif.; *Systematics and Evolution of the Genus Allium;* 3 years; $14,700.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; John N. Belkin, Department of Entomology, Los Angeles, Calif.; *Mosquitoes of the South Pacific;* 2 years; $8,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Thomas R. Howell, Department of Zoology, Los Angeles, Calif; *Avifauna of Nicaragua;* 1 year; $11,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Harlan Lewis, Department of Botany, Los Angeles, Calif.; *Systematics of the Family Onagraceae;* 3 years; $11,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; C. H. Muller, Department of Biological Sciences, Santa Barbara, Calif.; *Evolution and Taxonomy of American Oaks;* 3 years; $16,800.

CHICAGO ACADEMY OF SCIENCES, Chicago, Ill.; Howard K. Gloyd; *The Crotalid Snake Genus Agkistrodon;* 1 year; $2,000.

CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Philip Hershkovitz, Division of Mammals; *A Check-List of Recent Land Mammals of South America;* 3 years; $8,000.

CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Julian A. Steyermark, Department of Botany; *Revised Catalogue of Missouri Flora;* 1 year; $2,800.

UNIVERSITY OF CHICAGO, Chicago, Ill.; Alfred E. Emerson, Department of Zoology; *Taxonomic and Phylogenetic Studies of Termites;* 1 year; $10,500.

COLORADO AGRICULRURAL AND MECHANICAL COLLEGE, Fort Collins, Colo.; Victor B. Scheffer; *Zoological Significance of the Pinnipedia;* 1 year; $8,500.

CORNELL UNIVERSITY, Ithaca, N. Y.; Helen J. Illick, Biology Department, Russell Sage College, Troy, N. Y.; *Morphology of the Lateral-Line System in Cyprinidae;* 2 years; $3,400.

CORNELL UNIVERSITY, Ithaca, N. Y.; Edward C. Raney, Department of Conservation, Agricultural Experiment Station; *Systematics and Distribution of Fishes of Eastern United States;* 3 years; $9,000.

CRANBROOK INSTITUTE OF SCIENCE, Bloomfield Hills, Mich.; Warren P. Stoutamire, Assistant Botanist; *Cytotaxonomy of Gaillardia;* 3 years; $3,600.

DARTMOUTH COLLEGE, Hanover, N. H.; Carl L. Wilson, Department of Botany; *Floral Anatomy of the Dilleniaceae;* 1 year; $3,500.

DEPAUW UNIVERSITY, Greencastle, Ind., T. G. Yuncker, Department of Botany and Bacteriology; *Revision of the Plant Family Piperaceae in Brazil;* 3 years; $5,000.

DUKE UNIVERSITY, Durham, N. C.; Lewis E. Anderson, Department of Botany; *Renovation of the Grout Reference Slide Collection;* 2 years; $8,500.

DUKE UNIVERSITY, Durham, N. C.; William L. Culberson, Department of Botany; *Taxonomic Studies on the Lichen Flora of North America;* 1 year; $6,500.

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Ruth S. Breen, Department of Botany; *An Illustrated Guide to the Mosses of Florida;* 2 years; $5,000.

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Walter Auffenberg, Department of Biology; *Vertebrate Fauna of the Greater Antilles;* 2 years; $6,000.

GONZAGA UNIVERSITY, Spokane, Wash.; Ronald A. Ward, Department of Biology; *Speciation and Host-Relationships of Mallophaga;* 3 years; $4,000.

HARVARD UNIVERSITY, Cambridge, Mass.; Robert L. Dressler, Gray Herbarium; *Geographic Significance of the Tamaulipan Flora;* 2 years; $5,500.

HARVARD UNIVERSITY, Cambridge, Mass.; Richard A. Howard, Arnold Arboretum; *Vascular Patterns in Petioles of Woody Flowering Plants;* 2 years; $5,000.

UNIVERSITY OF HAWAII, Honolulu, T. H.; Albert H. Banner, Department of Zoology; *Zoogeography of the Alpheidae in the Central Pacific;* 1 year; $5,300.

UNIVERSITY OF HAWAII, Honolulu, T. H.; D. Elmo Hardy, Department of Entomology; *Diptera of Hawaii;* 3 years; $6,600.

UNIVERSITY OF HAWAII, Honolulu, T. H.; Harold St. John, Department of Botany; *Pandanus of the Pacific Islands;* 1 year; $9,600.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; John O. Corliss, Department of Zoology; *Systematics and Genetics of Ciliated Protozoa;* 3 years; $17,000.

INDIANA UNIVERSITY, Bloomington, Ind.; L. S. McClung, Department of Bacteriology; *Taxonomy of Anaerobic Bacteria (Genus Clostridium);* 3 years; $10,400.

INDIANA UNIVERSITY, Bloomington, Ind.; Frank N. Young, Department of Zoology; *Ecology and Taxonomy of Aquatic Coleoptera;* 3 years; $1,600.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; Martin J. Ulmer, Department of Zoology and Entomology; *Studies of Digenetic Trematodes and Other Helminths;* 2 years; $5,700.

UNIVERSITY OF KANSAS, Lawrence, Kans.; H. B. Hungerford, Department of Entomology; *Aquatic and Semi-Aquatic Hemiptera of the World;* 3 years; $15,000.

UNIVERSITY OF KANSAS, Lawrence, Kans.; Charles D. Michener, Department of Entomology; *Phylogenetic Taxonomy of South American Hymenoptera;* 2 years; $9,000.

LOS ANGELES STATE COLLEGE OF APPLIED ARTS AND SCIENCES, Los Angeles, Calif.; Richard M. Straw, Department of Botany; *Taxonomy of the Mexican Species of Penstemon;* 3 years; $7,500.

LOYOLA UNIVERSITY, New Orleans, La.; Walter G. Moore, Department of Biological Sciences; *Variation in Natural and Experimental Populations of Anostraca;* 1 year; $2,300.

MERCER UNIVERSITY, Macon, Ga.; David W. Johnston, Department of Biology; *Bio-Systematics of North American Species of Corvus;* 2 years; $3,400.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Lauren C. Gilman, Department of Zoology; *Variation in Paramecium Caudatum;* 2 years; $5,000.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Richard Robins, The Marine Laboratory; *The Inshore Fish Fauna of the Florida Keys;* 2 years; $10,000.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Gilbert L. Voss. The Marine Laboratory; *Cephalopods of the Philippine Islands;* 2 years; $5,600.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; George W. Gillett, Department of Botany and Plant Pathology; *Flora of Lassen Volcanic National Park;* 2 years; $3,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; R. J. Lowry and A. H. Smith, Department of Botany; *Cytology of the Fleshy Hymenomycetes in Relation to Their Phylogeny;* 2 years $10,600.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Rogers McVaugh, Department of Botany; *Vascular Flora of Jalisco;* 3 years; $14,700.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Henry K. Townes, Museum of Zoology; *Taxonomic Monographs of Nearctic Ichneumonidae;* 3 years; $17,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Alexander A. Granovsky, Department of Entomology and Economic Zoology; *Taxonomic Studies of Aphid Fauna;* 2 years; $7,000.

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; Hugh C. Cutler, Assistant Director; *History of Corn and Cultivated Cucurbita;* 2 years; $4,700.

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; Robert E. Woodson, Jr., Senior Taxonomist; *Flora of Panama;* 3 years; $15,000.

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; Tracy I. Storer, Department of Zoology, University of California, Davis, Calif.; *Biological and Ecological Study of Rats on Pacific Islands;* 2 years; $11,500.

COLLEGE OF NEW ROCHELLE, New Rochelle, N. Y.; Mary Dora Rogick, Department of Biology; *Bryozoa of the Antarctic;* 2 years; $2,700.

NEW YORK BOTANICAL GARDEN, New York, N. Y.; Donald P. Rogers, Curator; *Lower Basidiomycetes of Oregon;* 2 years; $10,000.

NEW YORK ZOOLOGICAL SOCIETY, New York, N. Y.; Myron Gordon, Genetics Laboratory; *A Biological Synthesis of the Poeciliid Fishes;* 2 years; $7,500.

OHIO ACADEMY OF SCIENCES, Cincinnati, Ohio; E. Lucy Braun, Department of Botany; *Vascular Flora of Ohio;* 3 years; $12,000.

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Robert W. Long, Jr., Department of Botany; *Natural Hybridization of Perennial Sunflowers;* 2 years; $3,000.

OREGON STATE COLLEGE, Corvallis, Oreg.; Albert N. Steward, Department of Botany; *An Illustrated Key to Aquatic Plants of the Pacific Northwest;* 2 years; $4,100.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Hui-Lin Li, Morris Arboretum; *Trees and Shrubs of Formosa;* 2 years; $6,400.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Malcolm T. Jollie, Department of Biological Sciences; *Phylogeny of the Falconiformes;* 1 year; $2,300.

POMONA COLLEGE, Claremont, Calif.; Lyman Benson, Department of Botany; *Cacti of United States and Canada;* 3 years; $8,000.

PORTLAND STATE COLLEGE, Portland, Oreg.; James A. Macnab, Division of Science; *Systematic Study of Endemic Earthworms;* 2 years; $9,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; John S. Karling, Department of Biological Sciences, Purdue University; *A Monographic Study of Synchytrium;* 3 years; $16,700.

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Syracuse, N. Y., Josiah L. Lowe, College of Forestry, Syracuse, N. Y.; *Polyporaceae of North America;* 2 years; $7,000.

UNIVERSITY OF RHODE ISLAND, Kingston, R. I.; Richard D. Wood, Department of Botany; *Revision of Characeae Taxonomy;* 2 years; $15,000.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Alan A. Boyden, Department of Zoology; *Classification of Representative Groups of Vertebrate Through Serological Studies;* 2 years; $18,000.

SMITHSONIAN INSTITUTION, Washington, D. C.; J. F. Gates Clarke, Department of Zoology; *Systematic Studies of Cerambycidae (Wood Boring Beetles);* 1 year; $21,600.

SMITHSONIAN INSTITUTION, Washington, D. C.; G. Arthur Cooper, Department of Geology; *Morphology and Paleoecology of Permian Brachiopods;* 4 years; $31,200.

SMITHSONIAN INSTITUTION, Washington, D. C.; Conrad V. Morton, Department of Botany; *Studies of Type Specimens of Ferns;* 2 years; $14,900.

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; William B. Stallcup, Department of Biology; *Serological Techniques in Avian Taxonomy;* 2 years; $2,800.

STANFORD UNIVERSITY, Stanford, Calif.; Victor C. Twitty, Department of Biological Sciences; *Biology of the Californian Species of Taricha;* 3 years; $24,800.

SWARTHMORE COLLEGE, Swarthmore, Pa.; Neal A. Weber, Department of Biology; *Fungus-Growing Ants and Their Fungi;* 2 years; $5,000.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; L. R. Hesler, College of Liberal Arts; *Taxonomic Study of Agaricales of the Southeastern United States;* 3 years; $8,500.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; A. J. Sharp, Department of Botany; *Vascular Plants of Tennessee;* 1 year; $975.

UNIVERSITY OF TEXAS, Austin, Tex.; R. K. Selander, Department of Zoology; *Speciation in Mexican Jays and Wrens;* 2 years; $6,000.

TULANE UNIVERSITY, New Orleans, La.; Royal D. Suttkus, Department of Zoology; *Speciation in the Subgenus Pteronotropis;* 1 year; $4,000.

UNION UNIVERSITY, Jackson, Tenn.; Allan F. Archer, Biology Department; *Antillean-Caribbean Fauna of Spiders and Other Arachnida;* 1 year; $3,200.

VALPARAISO UNIVERSITY, Valparaiso, Ind.; Carl H. Krekeler, Department of Biology; *Systematic Studies of Cavericolous Coleoptera;* 1 year; $2,600.

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Hubert W. Voglemann, Pringle Harbarium; *A Study of Pringle's Undistributed Botanical Collections;* 1 year; $2,500.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Walter S. Flory, Jr., Blandy Experimental Farm, Boyce, Va.; *Phylogeny in the Amaryllidaceae;* 3 years; $10,200.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Robert E. Woodson, Henry Shaw School of Botany; *Analysis of Peripheral Populations of Asclepias Tuberosa;* 2 years; $5,500.

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; Lars Z. Brundin, Department of Entomology; *Taxonomy, Ecology, and Distribution of Chironomidae;* 1 year; $1,700.

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; Mason E. Hale, Jr., Department of Biology; *Lichens of West Virginia;* 2 years; $3,800.

YALE UNIVERSITY, New Haven, Conn.; Theodore Delevoryas, Department of Botany; *Morphological Investigations of Cycadeoidales;* 3 years; $7,700.

YALE UNIVERSTY, New Haven, Conn.; John R. Reeder, Osborn Botanical Laboratory; *Taxonomy and Phylogeny of the Gramineae;* 2 years; $8,500.

General

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, Philadelphia, Pa.; H. Radclyffe Roberts, Director; *Systematic Biology Collections;* 3 years; $84,000.

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; E. G. Butler, President, Executive Committee of the American Society of Zoologists; *Policies and Future Activities of the American Society of Zoologists;* 2 years; $11,500.

BERMUDA BIOLOGICAL STATION, St. George's West, Bermuda; W. H. Sutcliffe, Jr., Director; *Repair and Improvement of Research Facilities;* 4 years; $19,000.

BROWN UNIVERSITY, Providence, R. I.; Z. R. Bliss, Department of Engineering; *Summer Investigations in Chemistry, Engineering, and Physics;* 3 months; $9,000.

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; Sidney Shulman, Chairman, Student Research Fellowship Committee; *Short-Term Research by Medical Students;* 3 years; $9,000.

BOSTON UNIVERSITY, Boston, Mass.; L. J. Reyna, Department of Psychology; *Renovation of the Boston University Psychology Laboratory;* 1 year; $25,800.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; G. D. McCann, Department of Electrical Engineering; *Computing Research;* 1 year; $38,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; G. W. Beadle, Chairman, Division of Biology; *Thesis Research by Graduate Students in Biology;* 3 years; $20,700.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; F. W. Went, Division of Biology; *A Mobile Research Laboratory for Desert Ecology;* 2 years; $30,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Otto Struve, Department of Astronomy; *Computing Research;* 1 year; $50,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Sherburne F. Cook, Professor of Physiology and Chairman, University of California Advisory Committee on High Altitude Research; *Construction of an Electrical Power Transmission Line for the White Mountain Research Station;* 2 years; $132,000.

CARLETON COLLEGE, Northfield, Minn.; Thurlo B. Thomas, Department of Biology; *Basic Research in Biology by Undergraduate and High School Students;* 3 years; $22,300.

UNIVERSITY OF CHICAGO, Chicago, Ill.; A. A. Albert, Chairman, Survey Committee; *Survey of Research Potential and Training in the Mathematical Sciences;* 6 months; $15,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; George V. Le Roy, Associate Dean, Division of Biological Sciences; *Short-Term Research by Medical Students;* 3 years; $12,000.

CORNELL UNIVERSITY, Ithaca, N. Y.; J. B. Rosser, Computing Center; *Computing Research;* 2 years; $50,000.

CORNELL UNIVERSITY, Ithaca, N. Y.; Lawrence W. Hanlon, Associate Dean, Medical College, New York, N. Y.; *Short-Term Research by Medical Students;* 3 years; $12,000.

DUKE UNIVERSITY, Durham, N. C.; C. G. Bookout, Director, Duke University Marine Laboratory; *Research and Training at the Duke University Marine Laboratory;* 3 years; $25,000.

EMORY UNIVERSITY, Emory University, Ga.; Carl C. Pfeiffer, Director, Division of Basic Health Sciences; *Short-Term Research by Medical Students;* 3 years; $12,000.

GULF COAST RESEARCH LABORATORY, Ocean Springs, Miss.; Gordon Gunter, Director; *Research and Training at the Gulf Coast Research Laboratory;* 1 year; $3,000.

HAHNEMANN MEDICAL COLLEGE AND HOSPITAL, Philadelphia, Pa.; Harold A. Taggart, Acting Dean; *Short-Term Research by Medical Students;* 1 year; $2,400.

HARVARD UNIVERSITY, Cambridge, Mass.; Henry C. Meadow, Assistant Dean; *Short-Term Research by Medical Students;* 3 years; $15,000.

HIGHLANDS BIOLOGICAL STATION, Highlands, N. C.; Thelma Howell, Executive Director; *Improvement of Facilities at the Highlands Biological Station;* 3 years; $60,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Milan Novak, Associate Dean, Chicago Professional Colleges, Chicago, Illinois; *Short-Term Research by Medical Students;* 3 years; $12,000.

INDIANA UNIVERSITY, Bloomington, Ind.; Dean Fraser, Department of Bacteriology; *An Electron Microscope for Biological Research;* 1 year; $27,000.

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Albert P. McKee, Chairman, Committee on Student Fellowships; *Short-Term Research by Medical Students;* 3 years; $6,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Philip Bard, Dean, School of Medicine; *Short-Term Research by Medical Students;* 3 years; $18,000.

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; William D. McElroy, Chairman, Mergenthaler Laboratory for Biology; *College Undergraduate and High School Biological Research Projects;* 2 years; $33,000.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Philip B. Armstrong, Director; *Optical Equipment for Use in Embryology and Invertebrate Zoology;* 1 year; $11,500.

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Philip B. Armstrong, Director; *Plant Rehabilitation: Modernization of Crane Wing of the Marine Biological Laboratory;* 2 years; $415,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; P. M. Morse, Department of Physics; *Computing Research;* 1 year; $30,000.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Wayne L. Whitaker, Assistant Dean; *Short-Term Research by Medical Students;* 3 years; $12,000.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; E. W. Ziebarth, Dean, Summer Session; *Biological Research and Training at the Lake Itasca Forestry and Biological Station;* 2 years; $18,800.

MOUNT DESERT ISLAND BIOLOGICAL LABORATORY, Salisbury Cove, Maine; Raymond Rappaport, Jr., Director; *General Support, Construction and Renovation of Facilities and Purchase of Major Equipment;* 3 years; $55,000.

NAPLES ZOOLOGICAL STATION, Naples, Italy; Peter Dohrn, Director; *General Support of the Naples Zoological Station, Italy;* 3 years; $24,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; J. S. Coleman, Executive Secretary; *The Committee on Nuclear Science;* 2 years; $25,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; Harold J. Coolidge, Executive Director; *Support of the Pacific Science Board;* 3 years; $45,000.

UNIVERSITY OF OKLAHOMA, Norman, Okla.; Carl D. Riggs, Director; University of Oklahoma Biological Station; *Research and Training at the University of Oklahoma Biological Station;* 2 years; $8,000.

OREGON STATE COLLEGE, Corvallis, Oreg.; A. T. Lonseth, Department of Mathematics; *Computing Research;* 1 year; $20,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Walter H. Gottschalk, Department of Mathematics; *Computing Research;* 1 year; $70,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; William B. Kennedy, Vice-Dean of the School of Medicine; *Short-Term Research by Medical Students;* 3 years; $15,000.

PRINCETON UNIVERSITY, Princeton, N. J.; Forman S. Acton, Department of Electrical Engineering; *Computing Research;* 1 year; $40,000.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Carl F. Kossack, Statistical Laboratory; *Computer Research;* 1 year; $33,000.

RESEARCH FOUNDATION OF THE STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Davis G. Johnson, Assistant Dean for Student Personnel, College of Medicine, Syracuse, N. Y.; *Short-Term Research by Medical Students;* 3 years; $12,000.

STANFORD UNIVERSITY, Stanford, Calif.; J. G. Herriot, Department of Mathematics; *Computing Research;* 1 year; $20,000.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Thomas P. Nash, Jr., Dean, Division of Biological Sciences; *Short-Term Research by Medical Students;* 3 years; $12,000.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; James N. Dent, William A. Jensen, Samuel Maroney, and Bruce Reynolds, Department of Biology; *Radioisotope Counting Equipment for Biological Research;* 1 year; $8,000.

WASHINGTON UNIVERSITY, St. Louis, Mo.; Edward W. Dempsey, Chairman of the Committee on Special Awards; *Short-Term Research by Medical Students;* 3 years; $12,000.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Carl B. Allendoerfer, Department of Mathematics; *Computing Research;* 1 year; $17,500.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Richard J. Blandau, Assistant Dean and Chairman; *Short-Term Research by Medical Students;* 3 years; $18,000.

UNIVERSITY OF WISCONSIN, Madison, Wis.; Preston C. Hammer, Numerical Analysis Laboratory; *Computing Research;* 1 year; $30,000.

YALE UNIVERSITY, New Haven, Conn.; Edgar J. Boell, Department of Zoology; *Facility for a Recirculating Seawater System;* 1 year; $20,000.

YALE UNIVERSITY, New Haven, Conn.; Vernon H. Lippard, Dean, School of Medicine; *Short-Term Research by Medical Students;* 3 years; $15,000.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; A. W. Martin, Department of Zoology; *Graduate Student Research and Training at the Friday Harbor Laboratories;* 2 years; $13,500.

APPENDIX C

Grants Other Than Research

Fiscal Year 1957

Conferences in Support of Science

American Association for the Advancement of Science, Washington, D. C.; *Gordon Conferences;* $10,000.

American Association of Physics Teachers, Bryn Mawr, Pa.; *Conference to Study Laboratory Instruction in General College Physics;* $7,475.

American Institute of Biological Sciences, Washington, D. C.; *The Role of Botany in American Education;* $4,106.

American Institute of Biological Sciences, Washington, D. C.; *Conference on Aging as a Biological Problem;* $10,000.

Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill.; *International Ozone Conference;* $5,000.

University of California, Berkeley, Calif.; *World Conference on Prestressed Concrete;* $10,000.

Canadian Mathematical Congress, Montreal, Canada; *Seminar in Mathematics and Physics;* $2,000.

University of Chicago, Chicago, Ill.; *Present Status and Future of Darwinian Evolution;* $13,000.

Electrochemical Society, Inc., New York, N. Y.; *Conference on the Structure of Electrolytic Solutions;* $10,000.

Harvard University, Cambridge, Mass.; *Symposium on the Scale of the Galaxy;* $1,380.

Hunter College, New York, N. Y.; *Conference on the Undergraduate Mathematics Curriculum;* $5,750.

University of Illinois, Urbana, Ill.; *Symposium on Radio Sources Outside the Galaxy;* $460.

Illinois State Academy of Sciences, Urbana, Ill.; *Undergraduate Research Conference;* $7,000.

State University of Iowa, Iowa City, Iowa; *The Midwest Conference on Theoretical Physics;* $1,500.

Johns Hopkins University, Baltimore, Md.; *Conference on the Education of Chemists;* $11,500.

Long Island Biological Association, Cold Spring Harbor, N. Y.; *XXIInd Cold Spring Harbor Symposium on Quantitative Biology;* $6,500.

Mathematical Association of America, Buffalo, N. Y.; *Conference Entitled A Study of the Possible Uses of Films in the Teaching of College Mathematics;* $1,200.

Missouri Botanical Garden, St. Louis, Mo.; *Basic Concepts and Techniques in Systematics;* $1,500.

National Academy of Sciences, Washington, D. C.; *Conference on Undergraduate Programs in the Biological Sciences and Ad Hoc Panels on Courses;* $10,000.

National Academy of Sciences, Washington, D. C.; *Nuclear Geophysics;* $5,100.

National Academy of Sciences, Washington, D. C.; *Fourth General Assembly and Congress of the International Union of Crystallography;* $6,900.

National Academy of Sciences, Washington, D. C.; *Planning for an International Conference on Scientific Information;* $38,100.

National Academy of Sciences, Washington, D. C.; *Photochemistry of Solids and Liquid Systems;* $11,300.

National Academy of Sciences, Washington, D. C.; *Archaeological Identifications by Specialists in Related Disciplines;* $3,300.

National Academy of Sciences, Washington, D. C.; *International Conference on Biogenesis;* $10,000.

National Academy of Sciences, Washington, D. C.; *Problems of Tektites;* $1,000.

National Academy of Sciences, Washington, D. C.; *Symposium on Photoperiodism;* $13,800.

New York Academy of Medicine, New York, N. Y.; *Symposium on Cellular and Humoral Aspects of the Hypersensitive States;* $4,100.

University of North Carolina, Chapel Hill, N. C.; *Gravitational Theory;* $5,000.

Northwestern University, Evanston, Ill.; *Liquid Scintillation Counting;* $4,000.

Ohio State University, Columbus, Ohio; *Size and Shape of the Earth;* $1,725.

Pennsylvania State University, University Park, Pa.; *Natural and Synthetic Minerals;* $1,100.

Society for the Study of Development and Growth, Princeton, N. J.; *Sixteenth Growth Symposium;* $5,800.

Smithsonian Institution, Washington, D. C.; *Third Symposium on Cosmical Gas Dynamics;* $3,500.

Stanford University, Stanford, Calif.; *Nuclear Sizes and Density Distributions;* $7,000.

U. S. National Committee, International Commission on Irrigation and Drainage, Denver, Colo.; *The Third International Congress on Irrigation and Drainage;* $5,000.

University of Utah, Salt Lake City, Utah; *Identification of Creative Scientific Talent;* $4,875.

University of Wisconsin, Madison, Wis.; *The Fifth International Conference on Low Temperature Physics and Chemistry;* $10,000.

Education in the Sciences

ACADEMIC YEAR INSTITUTES

University of Chicago, Chicago, Ill.; *Academic Year Institute for High School Teachers of Mathematics;* 10 months; $185,300.

University of Colorado, Boulder, Colo.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $303,650.

Harvard University, Cambridge, Mass.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $259,000.

University of Illinois, Urbana, Ill.; *Academic Year Institute for High School Teachers of Mathematics;* 10 months; $155,600.

University of Michigan, Ann Arbor, Mich.; *Academic Year Institute for High School Teachers of Science;* 10 months; $278,900.

University of North Carolina, Chapel Hill, N. C.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $267,600.

Ohio State University, Columbus, Ohio; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $266,230.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $276,100.

OREGON STATE COLLEGE, Corvallis, Oreg.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $270,050.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Academic Year Institute for High School Teachers of Science;* 10 months; $280,000.

STANFORD UNIVERSITY, Stanford, Calif.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $280,000.

UNIVERSITY OF TEXAS, Austin, Tex.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $291,300.

UNIVERSITY OF UTAH, Salt Lake City, Utah; *Academic Year Institute for High School Teachers of Mathematics;* 10 months; $299,280.

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $279,375.

WASHINGTON UNIVERSITY, St. Louis, Mo.; *Academic Year Institute for High School Teachers of Science and Mathematics;* 10 months; $279,600.

UNIVERSITY OF WISCONSIN, Madison, Wis.; *Academic Year Institute for High School Teachers of Science;* 10 months; $278,900.

IN-SERVICE INSTITUTES

ADELPHI COLLEGE, Garden City, N. Y.; *In-service Institute for Secondary School Teachers of Science;* 32 weeks; $4,830.

ANTIOCH COLLEGE, Yellow Springs, Ohio; *In-service Training Program for High School Teachers of Science and Mathematics;* 15 weeks; $8,450; spring 1957.

ANTIOCH COLLEGE, Yellow Springs, Ohio; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $21,350.

BALL STATE TEACHERS COLLEGE, Muncie, Ind.; *In-service Institute for Secondary School Teachers of Mathematics;* 32 weeks; $5,500.

BOWDOIN COLLEGE, Brunswick, Maine; *In-service Institute for Secondary School Teachers of Science;* 32 weeks; $5,500.

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; *In-service Institute for High School Teachers of Science and Mathematics;* 32 weeks; $3,980.

BROWN UNIVERSITY, Providence, R. I.; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $10,600.

CARLETON COLLEGE, Northfield, Minn.; *In-service Institute for Secondary School Teachers of Science;* 32 weeks; $5,270.

CORNELL UNIVERSITY, Ithaca, N. Y.; *In-service Institute for High School Teachers of Science and Mathematics;* 32 weeks; $4,200.

UNIVERSITY OF DENVER, Denver, Colo.; *In-service Institute for Secondary School Teachers of Science;* 32 weeks; $3,830.

EMORY UNIVERSITY, Emory University, Ga.; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $18,950.

FISK UNIVERSITY, Nashville, Tenn.; *In-service Institute for Secondary School Teachers of Chemistry;* 32 weeks; $4,750.

HAMPTON INSTITUTE, Hampton, Va.; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $10,000.

MOUNT MERCY COLLEGE, Pittsburgh, Pa.; *In-service Institute for Secondary School Teachers of Chemistry;* 32 weeks; $8,830.

MUNDELEIN COLLEGE, Chicago, Ill.; *In-service Institute for Secondary School Teachers of Biology;* 32 weeks; $2,290.

MURRAY STATE COLLEGE, Murray, Ky.; *In-service Institute for High School Teachers of Science and Mathematics;* 32 weeks; $3,970.

NEW YORK UNIVERSITY, New York, N. Y.; *In-service Institute for Secondary School Teachers of Mathematics;* 32 weeks; $5,750.

NEW YORK UNIVERSITY, New York, N. Y.; *In-service Institute for Secondary School Teachers of Science;* 32 weeks; $5,900.

UNIVERSITY OF PUERTO RICO, Mayaguez, P. R.; *In-service Institute for Secondary School Teachers of Mathematics;* 32 weeks; $3,200.

REED COLLEGE, Portland, Oreg.; *In-service Training Program for High School Teachers of Science and Mathematics;* 15 weeks; $3,500; spring 1957.

REED COLLEGE, Portland, Oreg.; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $10,530.

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, Rapid City, S. Dak.; *In-service Institute for Secondary School Teachers of Chemistry;* 36 weeks; $3,350.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; *In-service Institute for Secondary School Teachers of Science and Mathematics;* 32 weeks; $7,770.

SUMMER INSTITUTES

UNIVERSITY OF ALABAMA, University, Ala.; *Summer Institute for High School Teachers of Science;* 6 weeks; $49,800.

UNIVERSITY OF ALASKA; *Summer Institute for High School Science Teachers;* 8 weeks; $68,000.

ALLEGHENY COLLEGE, Meadville, Pa.; *Summer Institute for High School Teachers of Science;* 8 weeks; $38,100.

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Summer Institute in Applied Mathematics for College Teachers,* at the University of Colorado; 4 weeks; $22,400.

AMERICAN UNIVERSITY, Washington, D. C.; *Summer Institute for High School Teachers of Chemistry and Physics;* 8 weeks; $69,300.

ARIZONA STATE COLLEGE, Flagstaff, Ariz.; *Summer Institute for High School Teachers of Science;* 8 weeks; $59,200.

UNIVERSITY OF ARIZONA, Tucson, Ariz.; *Summer Institute for High School Teachers of Science;* 5 weeks; $42,500.

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; *Summer Institute for High School Teachers of Science;* 12 weeks; $131,800.

ATLANTA UNIVERSITY, Atlanta, Ga.; *Summer Institute for High School Teachers of Science and Mathematics;* 9 weeks; $43,500.

BAYLOR UNIVERSITY, Waco, Tex.; *Summer Institute for High School Teachers of Science;* 8 weeks; $72,900.

BOTANICAL SOCIETY OF AMERICA, Wellesley, Mass.; *Summer Institute for College Teachers of Botany,* at Cornell University; 6 weeks; $43,900.

BUCKNELL UNIVERSITY, Lewisburg, Pa.; *Summer Institute for High School Science Teachers;* 6 weeks; $53,000.

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; *Summer Institute for High School Teachers of Mathematics;* 4 weeks; $34, 400.

UNIVERSITY *of* CALIFORNIA, Berkeley, Calif.; *Summer Institute in Radiation Biology for High School Teachers of Science,* at Los Angeles; 6 weeks; $15,400.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $247,500.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Summer Institute for High School Teachers of Science;* 6 weeks; $10,200.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Summer Institute for High School Teachers of Science,* at Los Angeles; 6 weeks; $102,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $58,900.

CLAREMONT COLLEGE, Claremont, Calif.; *Summer Institute for High School and Junior College Teachers of Biology;* 4 weeks; $23,200.

CLARKSON COLLEGE OF TECHNOLOGY, Potsdam, N. Y.; *Summer Institute for High School Teachers of Science and Mathematics;* 7 weeks; $59,800.

COLORADO COLLEGE, Colorado Springs, Colo.; *Summer Institute for High School Teachers of Science;* 8 weeks; $64,000.

UNIVERSITY OF COLORADO, Boulder, Colo.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $51,500.

COLUMBIA UNIVERSITY, New York, N. Y.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $53,800.

CORNELL UNIVERSITY, Ithaca, N. Y.; *Summer Institute for High School Teachers of Science;* 6 weeks; $55,200.

DUKE UNIVERSITY, Durham, N. C.; *Summer Institute for High School Teachers and Elementary School Supervisors of Science;* 9 weeks; $89,500.

DUKE UNIVERSITY, Durham, N. C.; *Summer Institute in Radiation Biology for High School Teachers;* 8 weeks; $20,200.

FLORIDA STATE UNIVERSITY, Tallahasse, Fla.; *Summer Institute for High School Science Teachers;* 8 weeks; $46,700.

HARVARD UNIVERSITY, Cambridge, Mass.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $20,800.

UNIVERSITY OF HAWAII, Honolulu, Hawaii; *Summer Institute for High School Teachers of Science;* 8 weeks; $63,700.

HOWARD UNIVERSITY, Washington, D. C.; *Summer Institute for High School Teachers of Botany;* 8 weeks; $39,500.

UNIVERSITY OF IDAHO, Moscow, Idaho; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $69,000.

UNIVERSITY OF ILLINOIS, Urbana, Ill.; *Summer Institute for College Teachers of Geology;* 8 weeks; $40,800.

INDIANA UNIVERSITY, Bloomington, Ind.; *Summer Institute for High School Teachers of Biology;* 6 weeks; $33,200.

INDIANA UNIVERSITY, Bloomington, Ind.; *Summer Institute for High School Teachers of Mathematics;* 8 weeks; $49,600.

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; *Summer Institute for High School Teachers of Science;* 6 weeks, $64,600.

IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; *Summer Institute for High School Teachers of Science;* 6 weeks; $51,100.

KANSAS STATE TEACHERS COLLEGE, Emporia, Kans.; *Summer Institute for High School Teachers of Science;* 6 weeks; $53,200.

THE UNIVERSITY OF KANSAS, Lawrence, Kans.; *Summer Institute for High School and College Teachers of Mathematics;* 8 weeks; $74,900.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; *Summer Institute for High School Teachers of Science;* 9 weeks; $67,100.

THE MARSHALL FOUNDATION, INC., Huntington, W. Va.; *Summer Institute for High School Teachers of Physical Sciences;* 6 weeks; $42,700.

UNIVERSITY OF MARYLAND, College Park, Md.; *Summer Institute for High School Teachers of Science;* 6 weeks; $43,800.

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; *Summer Institute for High School Teachers of Mathematics;* 7 weeks; $54,000.

MIAMI UNIVERSITY, Oxford, Ohio; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $50,500.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; *Summer Institute for High School Teachers of Physical Sciences and Mathematics;* 6 weeks; $50,600.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; *Summer Institute for High School Teachers of Chemistry, Mathematics and Physics;* 8 weeks; $67,950.

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; *Summer Institute for High School Teachers of Physics, Chemistry, Biology, and Junior High School Teachers of General Science,* 5 weeks; $52,700.

UNIVERSITY OF MISSISSIPPI, University, Miss.; *Summer Institute for High School Teachers of Science and Mathematics;* 11 weeks; $80,600.

UNIVERSITY OF MISSOURI, Columbia, Mo.; *Summer Institute for High School Teachers of Chemistry;* 8 weeks; $61,700.

MONTANA STATE COLLEGE, Bozeman, Mont.; *Summer Institute for High School and College Teachers of Chemistry;* 5 weeks; $22,900.

MONTANA STATE COLLEGE, Bozeman, Mont.; *Summer Institute for High School Teachers of Mathematics and Engineering;* 5 weeks; $41,600.

MORGAN STATE COLLEGE, Baltimore, Md.; *Summer Institute for High School Teachers of Science;* 8 weeks; $66,000.

MURRAY STATE COLLEGE, Murray, Ky.; *Summer Institute for High School Teachers of Science;* 8 weeks; $72,600.

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; *Summer Institute for High School Teachers of Chemistry;* 8 weeks; $52,700.

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; *Summer Institute for High School Teachers of Chemistry;* 8 weeks; $67,300.

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $20,200.

NORTH CAROLINA COLLEGE AT DURHAM, Durham, N. C.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $55,700.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $75,500.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Summer Institute for College Teachers of Chemistry;* 6 weeks; $50,100.

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $63,500.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $47,000.

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, INC., Oak Ridge, Tenn.; *Summer Institute for High School Teachers of Sciences;* 4 weeks; $31,200.

OHIO UNIVERSITY, Athens, Ohio; *Summer Institute for High School Teachers of Science;* 6 weeks; $50,600.

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; *Summer Institute for High School Teachers of Physics and Chemistry;* 8 weeks; $57,300.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, Stillwater, Okla.; *Summer Institute for High School Teachers of Science and Mathematics;* 9 weeks; $70,200.

UNIVERSITY OF OKLAHOMA, Norman, Okla.; *Summer Institute for High School Teachers of Science;* 8 weeks; $69,500.

UNIVERSITY OF OREGON, Eugene, Oreg.; *Summer Institute for College Teachers of Biology;* 8 weeks; $31,600.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Summer Institute for High School Teachers of Science;* 6 weeks; $57,200.

POLYTECHNIC INSTITUTE OF PUERTO RICO, San German, P. R.; *Summer Institute for High School Teachers of Mathematics;* 8 weeks; $49,500.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; *Summer Institute for High School Teachers of Biology;* 8 weeks; $60,000.

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; *Summer Institute for High School Teachers of Science;* 8 weeks, $64,000.

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $43,800.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; *Summer Institute for High School Teachers of Biology;* 6 weeks; $25,500.

ST. LOUIS UNIVERSITY, St. Louis, Mo.; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $26,000.

SAN JOSE STATE COLLEGE, San Jose, Calif.; *Summer Institute for High School Teachers of Science;* 6 weeks; $48,600.

SOUTH DAKOTA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, College Station, S. Dak.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $52,400.

UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; *Summer Institute for High School Teachers of Science;* 8 weeks; $61,400.

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $27,600.

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $58,400.

STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; *Summer Institute for Junior High School Teachers of Mathematics;* 6 weeks; $31,200.

STEPHEN F. AUSTIN STATE COLLEGE, Nacogdoches, Tex.; *Summer Institute for High School Teachers of Science;* 6 weeks; $50,000.

SYRACUSE UNIVERSITY, Syracuse, N. Y.; *Summer Institute for High School Teachers of Science;* 6 weeks; $73,000.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; *Summer Institute in Radiation Biology for Tennessee High School Biology Teachers;* 5 weeks; $17,600.

UNIVERSITY OF TEXAS, Austin, Tex.; *Summer Institute for High School Teachers of Natural Science and Mathematics;* 6 weeks; $59,100.

TUFTS UNIVERSITY, Medford, Mass.; *Summer Institute for High School Teachers of Science;* 6 weeks; $42,500.

TUSKEGEE INSTITUTE, Tuskegee Institute, Ala.; *Summer Institute for High School Chemistry Teachers;* 8 weeks; $31,100.

UTAH STATE AGRICULTURAL COLLEGE, Logan, Utah; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $32,700.

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; *Summer Institute for High School Teachers of Physics;* 8 weeks; $62,800.

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; *Summer Institute for High School Teachers of Science;* 8 weeks; $62,900.

UNIVERSITY OF WASHINGTON, Seattle, Wash.; *Summer Institute for High School and College Teachers of Physics;* 9 weeks; $75,600.

WAYNE STATE UNIVERSITY, Detroit, Mich.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $20,200.

WESLEYAN UNIVERSITY, Middletown, Conn.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $48,100.

WESTERN MICHIGAN COLLEGE, Kalamazoo, Mich.; *Summer Institute for High School Teachers of Science;* 8 weeks; $37,700.

UNIVERSITY OF WISCONSIN, Madison, Wis.; *Summer Institute for High School Teachers of Chemistry;* 8 weeks; $61,800.

WORCESTER POLYTECHNIC INSTITUTE, Worcester, Mass.; *Summer Institute for High School Teachers of Physics and Mathematics;* 6 weeks; $36,000.

UNIVERSITY OF WYOMING, Laramie, Wyo.; *Summer Institute for High School Teachers of Mathematics;* 8 weeks; $70,300.

UNIVERSITY OF WYOMING, Laramie, Wyo.; *Summer Institute for High School Teachers of Physics and Chemistry;* 10 weeks; $97,000.

OTHER

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Workshop on Junior Academies of Science Activities;* 2 days; $5,100.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Traveling High School Science Library Program;* 1 year; $113,960.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Traveling High School Science Library Program;* 1 year; $65,100.

AMERICAN CHEMICAL SOCIETY, Washington, D. C.; *Visiting Scientists in Chemistry;* 1 year; $20,000.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Program of Lectures and Consultations by Visiting Scientists;* 1 year; $35,500.

AMERICAN PHYSIOLOGICAL SOCIETY, Augusta, Ga.; *Program of Summer Training for Teachers of College Physiology;* 1 year; $50,000.

AMERICAN SOCIETY OF ZOOLOGISTS, Princeton, N. J.; *Refresher Course Dealing With Recent Advances in the Study of Animal Behavior;* 4 days; $2,000.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; *Production of Sound-Color Films of Three Lectures;* 6 months; $20,275.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; *Summer Research Projects for Science Teachers in High Schools, Junior Colleges and Colleges;* 2 years; $20,924.

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Survey of East European Literature in Intermediate Mathematics;* 1 year; $6,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Survey of Recent East European Literature in Intermediate Mathematics;* 2 years; $20,700.

COLUMBIA UNIVERSITY, New York, N. Y.; *Summer Training for Secondary School Science Teachers;* 2 months; $18,600.

DUKE UNIVERSITY, Durham, N. C.; *Experimental Program in the Retraining of Armed Services Officers for Teaching Mathematics in High School and College;* 1 year; $9,500.

INDIANA UNIVERSITY, Bloomington, Ind.; *Production of a 45-Minute Sound-Color Film;* 6 months; $4,366.

KENTUCKY STATE DEPARTMENT OF EDUCATION, Frankfort, Ky.; *Five Regional Work Conferences on Science Instruction;* 2 days; $9,000.

UNIVERSITY OF KENTUCKY, Lexington, Ky.; *Summer Conference in Science for Elementary, Secondary, and College Teachers and School Administrators;* 26 days; $35,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Curriculum Workshop in Electrical Engineering Education;* 10 days; $20,000.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *The Teaching of Physical Science in the Secondary Schools;* 1 year; $545,000.

THE MATHEMATICAL ASSOCIATION OF AMERICA, Buffalo, N. Y.; *Visiting Lecturers;* 2 years; $55,200.

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; *Sourcebook of Laboratory and Field Studies for Secondary School Biology;* 8 weeks; $37,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Sourcebook of Laboratory and Field Studies for Secondary School Biology Courses;* 1 year; $15,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Career Opportunities in Biology,* $5,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Maintaining the National Register of Scientific and Technical Personnel in the Earth Sciences;* 12 months; $25,350.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Preparation of a Pamphlet of Guidance in Mathematics;* 1 year; $9,700.

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; *Training Program in Numerical Analysis for Senior University Staff;* 4 months; $55,400.

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS, Washington, D. C.; *Mathematics Teacher Education Materials Writing Project;* 9 months; $13,540.

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, INC., Oak Ridge, Tenn.; *A Traveling Science Demonstration Lecture Program for Secondary Schools;* 16 months; $115,800.

OREGON STATE COLLEGE, Corvallis, Oreg.; *Oregon State College Biology Colloquium;* 3 years; $4,500.

PURDUE UNIVERSITY, Lafayette, Ind.; *Development of a Master's Program To Prepare Retiring Military Officers To Teach Basic Courses in Mathematics in Colleges and Universities;* 1 year; $7,000.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; *Two 10-Day Science Institutes;* 10 days; $6,900.

SCIENCE SERVICE, INC., Washington, D. C.; *A Study of a Sample of the Participants in the Annual Science Talent Search;* 1 year; $18,500.

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; *The 1957 Southern Regional Graduate Summer Session in Statistics;* 6 weeks; $3,900.

WGBH EDUCATIONAL FOUNDATION, Cambridge, Mass.; *Three Pilot Films for a Series on the International Geophysical Year;* 6 months; $85,900.

UNIVERSITY OF WISCONSIN, Madison, Wis.; *History of Science Institute;* 10 days; $24,270.

Scientific Manpower

AMERICAN ASSOCIATION OF UNIVERSITY WOMEN, Washington, D. C.; *Exploratory Statistical Survey in the Teaching Field;* 3 months; $2,500.

AMERICAN CHEMICAL SOCIETY, Washington, D. C.; *Register of Scientific and Technical Personnel in the Field of Chemistry;* 1 year; $60,000.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *National Register of Scientific and Technical Personnel in the Fields of Physics and Astronomy;* 9 months; $10,875.

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Register of Scientific and Technical Personnel in the Field of the Mathematical Sciences;* 1 year; $19,000.

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Register of Scientific and Technical Personnel in the Field of the Mathematical Sciences;* 6 months; $6,125.

THE AMERICAN SOCIETY FOR ENGINEERING EDUCATION, Urbana, Ill.; *A Study of the Development of Engineering Faculties;* 3 months; $22,517.

THE UNIVERSITY OF CHICAGO, Chicago, Ill.; *The Assessment of Scientific Talent;* 1 year; $20,125.

ENGINEERS JOINT COUNCIL, New York, N. Y.; *Pilot Study of Demand for Engineers in Selected Industries;* 5 months; $4,500.

ENGINEERS JOINT COUNCIL, New York N. Y.; *Register of Scientific and Technical Personnel in the Field of Engineering;* 1 year; $18,350.

FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, Washington, D. C.; *National Register of Scientific and Technical Personnel in the Field of Biology;* 1 year; $30,850.

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PUBLIC MANAGEMENT RESEARCH INSTITUTE, San Francisco, Calif.; *Study of the Availability of Retired Military Personnel for High School Science and Mathematics Teaching Assignments;* 5 months; $7,834.

Attendance at International Meetings

Colloquium on Theory of Functions, Helsinki, Finland:

P. C. ROSENBLOOM, Harvard University, Cambridge, Mass.
H. L. ROYDEN, Stanford University, Stanford, Calif.

Conference on the Educational, Psychological, and Philosophical Problems of the Science Curriculum, Hamburg, Germany:

D. WOLFLE, American Association for the Advancement of Science, Washington, D. C.

Conference on Coordination of Galactic Research, Stockholm, Sweden:

D. S. HEESCHEN, Harvard College Observatory, Cambridge, Mass.
A. N. VYSSOTSKY, University of Virginia, Charlottesville, Va.
M. F. WALKER, Warner and Swasey Observatory, East Cleveland, Ohio.
H. F. WEAVER, Harvard College Observatory, Cambridge, Mass.

Conference on Thermodynamics and Transport Properties of Fluids, London, England:

E. W. COMINGS, Purdue University, Lafayette, Ind.
J. E. POWERS, University of Oklahoma, Norman, Okla.

Congress of the International Union for the Scientific Study of Population, Stockholm, Sweden:

D. J. BOGUE, Population Research and Training Center, Chicago, Ill.
A. J. COALE, Office of Population Research, Princeton, N. J.
P. M. HAUSER, University of Chicago, Chicago, Ill.
F. LORIMER, American University, Washington, D. C.
F. W. NOTESTEIN, Office of Population Research, Princeton, N. J.
C. F. SCHMID, University of Washington, Seattle, Wash.
P. K. WHELPTON, Miami University, Oxford, Ohio.

Eighth International Congress for the History of Science, Florence and Milan, Italy:

C. C. GILLISPIE, Princeton University, Princeton, N. J.
C. D. HELLMAN, New York, N. Y.
T. P. HUGHES, Richmond, Va.
G. MILLER, Cleveland Heights, Ohio.
C. D. O'MALLEY, Stanford University, Stanford, Calif.
D. H. D. ROLLER, University of Oklahoma, Norman, Okla.
E. ROSEN, New York, N. Y.
G. D. DE SANTILLANA, Massachusetts Institute of Technology, Cambridge, Mass.
R. H. SHRYOCK, Johns Hopkins Medical School, Baltimore, Md.
W. D. STAHLMAN, Melrose, Mass.
G. K. TALLMADGE, Marquette University, Milwaukee, Wis.
I. VEITH, University of Chicago, Chicago, Ill.
L. P. WILLIAMS, Madison, Conn.
H. WOOLF, University of Washington, Seattle, Wash.

Enzyme Commission of the International Union of Biochemistry, Paris, France:

S. P. COLOWICK, Johns Hopkins University, Baltimore, Md.
A. L. LEHNINGER, Johns Hopkins School of Medicine, Baltimore, Md.

European Pollen Conference, Geneva, Switzerland, and the Annual Meeting of the British Association of Science, Dublin, Ireland:

P. B. SEARS, Yale University, New Haven, Conn.

Executive Committee of the International Astronomical Union, Liege, Belgium:

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

Faraday Society Discussion on Nucleic Acid, London, England:

E. CHARGAFF, Columbia University, New York, N. Y.
P. DOTY, Harvard University, Cambridge, Mass.
R. M. HERRIOTT, Johns Hopkins University, Baltimore, Md.

Fifteenth International Congress of Psychology, Brussels, Belgium:

M. H. APPLEZWEIG, Connecticut College, New London, Conn.
C. H. COOMBS, University of Michigan, Ann Arbor, Mich.
R. S. CRUTCHFIELD, University of California, Berkeley, Calif.
L. FESTINGER, Stanford University, Stanford, Calif.
W. R. GARNER, Johns Hopkins University, Baltimore, Md.
E. P. HOLLANDER, Carnegie Institute of Technology, Pittsburgh, Pa.
H. F. HUNT, University of Chicago, Chicago, Ill.
J. J. JENKINS, University of Minnesota, Minneapolis, Minn.
T. S. KENDLER, Barnard College, New York, N. Y.
R. B. MACLEOD, University of Pennsylvania, Philadelphia, Pa.
D. R. MEYER, Ohio State University, Columbus, Ohio.
R. M. REITAN, Indiana University Medical Center, Indianapolis, Ind.
J. P. SCOTT, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine.
S. S. STEVENS, Harvard University, Cambrige, Mass.
S. WAPNER, Clark University, Worcester, Mass.

Fifteenth International Congress of Pure and Applied Chemistry, Lisbon, Portugal:

P. DELAHAY, Louisiana State University, Baton Rouge, La.
W. MEINKE, University of Michigan, Ann Arbor, Mich.

First International Congress of Neurological Sciences, Brussels, Belgium:

J. N. ALLEN, University of North Carolina, Chapel Hill, N. C.
J. H. AUSTIN, University of Oregon, Portland, Oreg.
J. S. BARLOW, Massachusetts General Hospital, Boston, Mass.
R. W. DOTY, University of Michigan, Ann Arbor, Mich.
E. L. GASTEIGER, Jr., Harvard Medical School, Boston, Mass.
E. HENNEMAN, Harvard Medical School, Boston, Mass.
A. HEYMAN, Duke University, Durham, N. C.
E. A. KABAT, Columbia University, New York, N. Y.
H. KLUVER, University of Chicago, Chicago, Ill.
H. G. J. M. KUYPERS, Bressler Research Laboratory, Baltimore, Md.
J. C. LILLY, National Institute of Mental Health, Bethesda, Md.
D. P. C. LLOYD, The Rockefeller Institute, New York, N. Y.
F. A. METTLER, Columbia University, New York, N. Y.
H. PORTER, Massachusetts General Hospital, Boston, Mass.
R. W. PORTER, Walter Reed Army Medical Center, Washington, D. C.
W. RIESE, Medical College of Virginia, Richmond, Va.
P. SCHEINBERG, University of Miami, Coral Gables, Fla.
J. SUTIN, Yale University School of Medicine, New Haven, Conn.
B. H. WAKSMAN, Massachusetts General Hospital, Boston, Mass.

First Regional Conference on Electron-Microscopy in Asia and Oceania, Tokyo, Japan:

H. S. BENNETT, University of Washington, Seattle, Wash.

Fourteenth Congress of Internal Medicine, Moscow, Russia:

G. E. BURCH, Tulane University, New Orleans, La.

Fourth International Congress of Nutrition, Paris, France:

S. N. GERSHOFF, Harvard School of Public Health, Boston, Mass.
C. H. HILL, North Carolina State College, Raleigh, N. C.
J. M. Iacono, Fitzsimons Army Hospital, Denver, Colo.
I. E. LIENER, University of Minnesota, Institute of Agriculture, St. Paul, Minn.
T. D. LUCKEY, University of Missouri, Columbia, Mo.
J. A. URAM, U. S. Department of Health, Education, and Welfare, Washington, D. C.

Fourth International Gerontological Congress, Merano, Italy:

W. BONDAREFF, National Institute of Mental Health, Bethesda, Md.
J. BOTWINICK, National Institute of Mental Health, Bethesda, Md.
H. BRODY, University of Buffalo, Buffalo, N. Y.
J. GARBUS, National Institute of Mental Health, Bethesda, Md.
A. H. NORRIS, Baltimore City Hospitals, Baltimore, Md.
M. ROCKSTEIN, New York University, New York, N. Y.

Fourth International Instruments and Measurements Conference, Stockholm, Sweden:

C. DE M. BARNES, Falls Church, Va.
R. L. BUTENHOFF, Kensington, Md.
W. S. RODNEY, Scranton, Pa.

Geochemical Symposium of the XVIth International Congress for Pure and Applied Chemistry, Paris, France:

J. A. S. ADAMS, Rice Institute, Houston, Texas.
A. W. ADAMSON, University of Southern California, Los Angeles, Calif.
S. H. BAUER, Cornell University, Ithaca, N. Y.
E. I. BECKER, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
G. BUCHI, Massachusetts Institute of Technology, Cambridge, Mass.
M. BURTON, University of Notre Dame, Notre Dame, Ind.
R. B. CARLIN, Carnegie Institute of Technology, Pittsburgh, Pa.
S. G. COHEN, Brandeis University, Waltham, Mass.
W. H. HARTUNG, Medical College of Virginia, Richmond, Va.
F. G. HELFFERICH, California Institute of Technology, Pasadena, Calif.
J. HINE, Georgia Institute of Technology, Atlanta, Ga.
H. O. HOUSE, Massachusetts Institute of Technology, Cambridge, Mass.
M. G. INGHRAM, University of Chicago, Chicago, Ill.
W. D. KINGERY, Massachusetts Institute of Technology, Cambridge, Mass.
E. M. KOSOWER, University of Wisconsin, Madison, Wis.
R. C. LORD, Massachusetts Institute of Technology, Cambridge, Mass.
R. E. LUTZ, University of Virginia, Charlottesville, Va.
A. E. MARTELL, Clark University, Worcester, Mass.
C. L. MCCABE, Carnegie Institute of Technology, Pittsburgh, Pa.
P. A. MCCUSKER, University of Notre Dame, Notre Dame, Ind.
A. MUAN, Pennsylvania State University, University Park, Pa.
H. NEURATH, University of Washington, Seattle, Wash.
J. R. NIELSEN, University of Oklahoma, Norman, Okla.
F. RAMIREX, Columbia University, New York, N. Y.

K. L. RINEHART, Jr., University of Illinois, Urbana, Ill.
V. J. SHINER, Jr., Indiana University, Bloomington, Ind.
A. SILVERMAN, University of Pittsburgh, Pittsburgh, Pa.
P. S. SKELL, Pennsylvania State University, University Park, Pa.
W. T. SMITH, Jr., University of Kentucky, Lexington, Ky.
M. SZWARC, State University of New York, Syracuse, N. Y.
E. WENKERT, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
J. E. WILLARD, University of Wisconsin, Madison, Wis.
W. G. YOUNG, University of California, Los Angeles, Calif.

Initiation and Growth of Explosion in Solids, London, England:

R. B. PARLIN, University of Utah, Salt Lake City, Utah.

International Conference on Gas Discharge Phenomena, Venice, Italy:

L. H. FISHER, New York University, New York, N. Y.
R. N. VARNEY, Washington University, St. Louis, Mo.

International Conference on Surface Activity, London, England:

J. J. BIKERMAN, Massachusetts Institute of Technology, Cambridge, Mass.
J. G. CHESSICK, Lehigh University, Bethlehem, Pa.
V. K. LAMER, Columbia University, New York, N. Y.
S. ROSS, Rensselaer Polytechnic Institute, Troy, N. Y.

International Group Colloquium, Tubingen, Germany:

R. C. LYNDON, University of California, Berkeley, Calif.

International Study Conference on Classification for Information Retrieval, Dorking, Surrey, England:

J. H. SHERA, Western Reserve University, Cleveland, Ohio.

International Union of Pure and Applied Physics Biennial Conference on Cosmic Rays, Varenna, Italy:

G. BURBIDGE, California Institute of Technology, Pasadena, Calif.
G. COCCONI, Cornell University, Ithaca, N. Y.
L. DAVIS, Jr., California Institute of Technology, Pasadena, Calif.
T. GOLD, Harvard University, Cambridge, Mass.
K. GREISEN, Cornell University, Ithaca, N. Y.
M. SCHEIN, University of Chicago, Chicago, Ill.

Isotopes and Radiation in Research for Medicine and Industry, Moscow, Russia:

H. J. GOMBERG, University of Michigan, Ann Arbor, Mich.

Meeting of the Executive Committee of the I. U. B. S., Gif-sur-Yvette, France:

R. E. CLELAND, Indiana University, Bloomington, Ind.

Meeting of the International Committee of Electrochemical Thermodynamics and Kinetics (C. I. T. C. E.), Madrid, Spain:

J. O'M. BOCKRIS, University of Pennsylvania, Philadelphia, Pa.

Meeting "Societe Francaise de Metallurgie," Paris, France:

R. T. MEHL, Carnegie Institute of Technology, Pittsburgh, Pa.

Ninth International Congress on Applied Mechanics, Brussels, Belgium:

F. R. ARNOLD, Stanford University, Stanford, Calif.
M. A. BIOT, New York, N. Y.
A. P. BORESI, University of Illinois, Urbana, Ill.
S. F. BORG, Stevens Institute of Technology, Hoboken, N. J.

M. R. CARSTENS, Georgia Institute of Technology, Atlanta, Ga.
CHIA-SHUN YIH, State University of Iowa, Iowa City, Iowa.
N. V. FEODOROFF, Manhattan College, New York, N. Y.
F. N. FRENKIEL, Johns Hopkins University, Silver Spring, Md.
A. T. IPPEN, Massachusetts Institute of Technology, Cambridge, Mass.
S. JUHASZ, Southwest Research Institute, San Antonio, Tex.
T. R. KANE, Havertown, Pa.
G. MESMER, Washington, University, St. Louis, Mo.
R. D. MINDLIN, Katonah, N. Y.
G. MURPHY, Iowa State College, Ames, Iowa.
R. M. ROSENBERG, University of Toledo, Toledo, Ohio.
J. A. SAUER, Pennsylvania State University, University Park, Pa.
M. D. VAN DYKE, Los Altos, Calif.

Ninth International Congress of Cell Biology, St. Andrews, Scotland.

R. D. ALLEN, Princeton University, Princeton, N. J.
J. G. GALL, University of Minnesota, Minneapolis, Minn.
J. W. HASTINGS, Northwestern University, Evanston, Ill.
H. HOLTZER, University of Pennsylvania, Philadelphia, Pa.
G. G. LATIES, California Institute of Technology, Pasadena, Calif.
M. A. LESSLER, Ohio State University, Columbus, Ohio.
D. MAZIA, University of California, Berkeley, Calif.
V. MENKIN, Temple University, Philadelphia, Pa.
W. PLAUT, University of Wisconsin, Madison, Wis.
L. I. REBHUN, University of Illinois, Chicago, Ill.
H. RIS, University of Wisconsin, Madison, Wis.
B. L. VALLEE, Harvard Medical School and Peter Bent Brigham Hospital, Boston, Mass.
C. E. WILDE, JR., University of Pennsylvania, Philadelphia, Pa.
P. R. WHITE, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine.

Ninth General Assembly of the 18th Congress of the International Geographical Union, Rio de Janeiro, Brazil:

C. B. HITCHCOCK, American Geographical Society, New York, N. Y.

Organizational Meeting of the Section on Experimental Psychology, Strasbourg, France:

C. H. GRAHAM, Columbia University, New York, N. Y.
H. S. LANGFELD, Princeton, N. J.

Parasites and Their Vertebrate Hosts (Host Specificity and Parallel Evolution Among Parasites), Neuchatel, Switzerland:

N. KENT, Johns Hopkins University, Baltimore, Md.
H. W. MANTER, University of Nebraska, Lincoln, Nebr.
E. MAYR, Harvard University, Cambridge, Mass.
B. PATTERSON, Harvard University, Cambride, Mass.

Provisional Committee for International Control Federation, Düsseldorf, Germany:

R. OLDENBURGER, Purdue University, Lafayette, Ind.

Scientific Symposium, London—Tercentenary Commemoration of the Harveian Society, London and Folkstone, England:

L. N. KATZ, Michael Reese Hospital, Chicago, Ill.

Second All-Union Conference on Antibiotics, Moscow, Russia:

S. A. WAKSMAN, Rutgers University, New Brunswick, N. J.

Second International Congress of Photobiology, Turin, Italy:

R. L. AMY, Susquehanna University, Selinsgrove, Pa.
E. C. CANTINO, Michigan State University, East Lansing, Mich.
J. JAGGER, Oak Ridge National Laboratory, Oak Ridge, Tenn.
W. D. MCELROY, Johns Hopkins University, Baltimore, Md.
A. D. MCLAREN, University of California, Berkeley, Calif.
B. A. RUBIN, Baylor University, Houston, Tex.
J. H. C. SMITH, Carnegie Institution of Washington, Stanford, Calif.
K. V. THIMANN, Harvard University, Cambridge, Mass.
G. WALD, Harvard University, Cambridge, Mass.
S. G. WILDMAN, University of California, Los Angeles, Calif.

Series of Seminars and Lectures for Soviet Physicists, Moscow, Russia:

F. E. LOW, Massachusetts Institute of Technology, Cambridge, Mass.

Seventh Congress of the International Association for Hydraulic Research, Lisbon, Portugal:

S. F. BORG, Stevens Institute of Technology, Hoboken, N. J.

Sixth Congress of the International Society for the Study of Biological Rhythms, Semmering, Austria:

F. HALBERG, University of Minnesota, Minneapolis, Minn.
E. C. KRIS, Massachusetts Institute of Technology, Cambridge, Mass.
L. STARK, Yale University, New Haven, Conn.
G. C. STEPHENS, University of Minnesota, Minneapolis, Minn.

Study of Bioclimatology, Paris, France:

F. SARGENT, II, University of Illinois, Urbana, Ill.

Subcommittee of CSAGI on Simultaneous Measurements of Gravity Acceleration, Paris, France:

W. D. LAMBERT, Canaan, Conn.

Symposium on Non-Stable Stars, Burakan and Abestumani, Russia:

J. L. GREENSTEIN, California Institute of Technology, Pasadena, Calif.

Third International Congress of the International Union for the Study of Social Insects, Paris, France:

R. E. GREGG, University of Colorado, Boulder, Colo.
W. E. LABERGE, Iowa State College, Ames, Iowa.

Thirtieth Session of the International Statistical Institute, Stockholm, Sweden:

J. BERKSON, Mayo Clinic, Rochester, Minn.
A. H. BOWKER, Stanford University, Stanford, Calif.
F. A. HANNA, Duke University, Durham, N. C.

Travel to Italian Universities:

B. ROSSI, Massachusetts Institute of Technology, Cambridge, Mass.

Twentieth International Geological Congress, Haarlem, Holland:

E. INGERSON, Chevy Chase, Md.

Vingt-Neuvieme Congress de Chemie Industrielle, Paris, France:

J. M. D. VALLE, Georgia Institute of Technology, Atlanta, Ga.

Scientific Information Exchange

THE AMERICAN ASSOCIATION OF MUSEUMS, Washington, D. C.; *Museum Standards;* 3 days; $250.

AMERICAN BRYOLOGICAL SOCIETY, Tallahassee, Fla.; *Index to Volumes 1–60 of* The Bryologist; 2 years; $5,850.

AMERICAN COUNCIL OF LEARNED SOCIETIES, Washington, D. C.; *Summer Seminar in Mechanical Translation;* 1 year; $6,000.

AMERICAN DOCUMENTATION INSTITUTE, Washington, D. C.; *Payment of Annual Dues for 1956 to the International Federation of Documentation;* 1 year; $650.

AMERICAN GEOPHYSICAL UNION, Washington, D. C.; *An English-Language Abstract Journal in the Field of Geophysics;* 1 year; $18,500.

AMERICAN GEOPHYSICAL UNION, Washington, D. C.; *An English Edition of the Russian Journal, Izvestiia Akademii Nauk USSR. Seriia Geofizicheskaia (Bulletin of the Academy of Sciences of the USSR. Geophysics Series) and a Study of the Trudy Geofizicheskogo Instituta Akademii Nauk (Proceedings of the Geophysics Institute of the Academy of Science);* 1 year; $22,400.

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *English Editions of Three Russian Journals: Microbiology, Plant Physiology and Doklady (Biological Sciences and Botanical Science Sections);* 1 year; $57,860.

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Translation and Publication of Two Russian Language Reference Works in the Field of Plant Morphology and Evolution by A. L. Takhtadjian;* 1 year; $7,000.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Economic Study of Back-Number Sales, Overprinting of Journal Issues;* 1 year; $10,000.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *English Edition of the Russian Journal, Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki;* 1 year; $28,500.

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Preparation of a Manual for the Authors of Papers for Publication in the Physics Journals;* 2 years; $8,200.

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; *Preparing and Distributing Selected Translations of Russian Mathematics;* 1 year; $17,685.

AMERICAN METEOROLOGICAL SOCIETY, Boston, Mass.; *Comparative Study of the Unit Costs of Preparing Bibliographies and Abstracts;* 8 months; $1,320.

AMERICAN PSYCHOLOGICAL ASSOCIATION, Washington, D. C.; *Reducing the Publication Lags in Two of the American Psychological Association's Journals;* 18 months; $28,400.

THE AMERICAN PHYSIOLOGICAL SOCIETY, Washington, D. C.; *Physiological Triggers and Discontinuous Rate Processes;* 3 years; $3,000.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, N. Y.; *Applied Mechanics Reviews;* 1 year; $5,000.

ASSOCIATION OF SPECIAL LIBRARIES AND INFORMATION BUREAUX, London, England; *The Efficiency of Information Retrieval Systems;* 2 years; $28,300.

ASTRONOMICAL LEAGUE, Washington, D. C.; *Proceedings of the 1956 General Convention of the Astronomical League;* 6 months; $1,000.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Stellar Spectra;* 2 years; $14,500.

CAMBRIDGE LANGUAGE RESEARCH UNIT, Cambridge, England; *New Logico-Mathematical Methods for the Analysis of Languages for Machine Translation;* 1 year; $27,100.

CARNEGIE INSTITUTION OF WASHINGTON, Washington, D. C.; *International Consultation on Related Problems of Optical and Radio Astronomy;* 18 months; $9,000.

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; *Operations Research in the Area of Scientific Communication;* 1 year; $59,000.

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Stars and Stellar Systems;* 1 year; $8,800.

COLUMBIA UNIVERSITY, New York, N. Y.; *Pilot Study into the Needs and Means of Information Exchange in Selected Branches of Physical and Biological Science;* 1 year; $15,800.

CORNELL, UNIVERSITY, Ithaca, N. Y.; *Research Training in Electron Microscopy;* 4 years; $50,800.

GEORGETOWN UNIVERSITY, Washington, D. C.; *Mechanical Translation;* 1 year; $125,000.

THE GEORGE VANDERBILT FOUNDATION, Stanford, Calif.; *Thalmann's Index of Genera and Species of Foraminifera 1890–1950;* 3 years; $10,000.

HARVARD UNIVERSITY, Cambridge, Mass.; *Check-List of Birds of the World;* 5 years; $17,000.

HARVARD UNIVERSITY, Cambridge, Mass.; *English Translation of Botanical Observations in the Spanish Manuscript, Travels in Peru and Chile;* 1 year; $575.

UNIVERSITY OF HAWAII, Honolulu, Hawaii: *Insects of Hawaii;* 4 years; $20,000.

HEBREW UNIVERSITY, Jerusalem, Israel; *Critical Investigation of Proposed Theories of Information Search Systems and a Study of the Possibilities of Complete-Phrase Indexing;* 1 year; $1,500.

HERNER, MEYER & Co., Washington, D. C.; *Development and Analysis of a Scientific Literature Classification System;* 1 year; $11,700.

HERNER, MEYER & Co., Washington, D. C.; *Subject Slanting in Scientific Indexing and Abstracting Services;* 5 months; $5,100.

HISTORY OF SCIENCE SOCIETY, Norwalk, Conn.; *Emergency Support of Annual Critical Bibliography;* 3 years; $6,000.

HUMAN RELATIONS AREA FILES, New Haven, Conn.; *Processing of Source Materials on Selected Areas and Peoples;* 1 year; $17,000.

INDIANA UNIVERSITY, Bloomington, Ind.; *Bibliography of the Genetics of Drosophila;* 1 year; $2,100.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, London, England, *International Abstracting Board;* 1 year; $5,000.

INTERNATIONAL UNION OF PHYSIOLOGICAL SCIENCES, Minneapolis, Minn.; *Traveling Conference-Lecture Teams in Physiology;* 2 years; $10,000.

LIBRARY OF CONGRESS, Washington, D. C.; *A Subject Index to the Astia Title Announcement Bulletin;* 6 months; $15,000.

LIBRARY OF CONGRESS, Washington, D. C.; *Compilation of an Accessions List of Scientific and Technical Serials of the Library of Congress;* 1 years; $12,000.

LIBRARY OF CONGRESS, Washington, D. C.; *Reference Center for Reports on Government-Supported Scientific Research;* 1 year; $19,000.

LIBRARY OF CONGRESS, Washington, D. C.; *Study of the Availability and Utilization of Japanese Scientific Literature in the United States;* 1 year; $8,000.

LONG ISLAND BIOLOGICAL LABORATORY, Cold Spring Harbor, N. Y.; *The Mutants of Drosophila Melanogaster;* 18 months; $12,500.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Methods of Translating Languages by Machine;* 1 year; $35,200.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Support of an International Conference on Mechanical Translation;* 5 days; $5,800.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; *Emergency Support of the Michigan Mathematical Journal;* 3 years; $3,500.

THE MIDWEST INTER-LIBRARY CENTER, Chicago, Ill.; *A Preliminary Study Toward Establishment of a Biological Journal Center;* 6 weeks; $4,140.

THE MIDWEST INTER-LIBRARY CENTER, Chicago, Ill.; *Chemical Journal Center;* 1 year; $11,700.

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; *Translation of "Flora of Japan" into English;* 1 year; $2,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Advisory Committees on United States Participation in International Scientific Organizations;* 1 year; $22,770.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *Publication of Proceedings of the VIIIth General Assembly and the XVIIth Congress of the International Geographical Union;* 1 year; $12,000.

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *The Biology Code and Key and an Analytical History of the Chemical-Biological Coordination Center;* 10 months; $18,600.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Feasibility Study of the Application of Linguistic Transformations to Information Retrieval;* 3 months; $1,950.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Investigation of Linguistic Transformation for Information Retrieval;* 1 year; $24,300.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Translation and Publication of Abstracts from the Russian Journal,* Referativnyi Zhurnal: Biologiia; 1 year; $7,680.

PRINCETON UNIVERSITY PRESS, Princeton, N. J.; *Some Problems of Chemical Kinetics and Reactivity;* 1 year; $1,500.

SMITHSONIAN INSTITUTION, Washington, D. C.; *Biological Sciences Information Exchange;* 1 year; $25,000.

SOCIETY OF SPONSORING THE INTERNATIONAL GENETICS SYMPOSIA, Ueno Park, Tokyo; *Publication of Proceedings of the International Genetics Symposia;* 1 year; $4,500.

SOCIETY OF SYSTEMATIC ZOOLOGY, Victor, N. Y.; *Directory of Specialists in Taxonomy of Animals;* 2 years; $8,400.

SPECIAL LIBRARIES ASSOCIATION, Manville, N. J.; *Scientific Translations Center;* 1 year; $20,350.

UNIVERSITY OF UTAH, Salt Lake City, Utah; *Translations in Aztec Anthropology;* 3 years; $12,600.

UNIVERSITY OF VERMONT, Burlington, Vt.; *Biochemistry Exchange Professorship;* 1 year; $1,600.

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; *Feasibility Study on Centralized Information Services;* 4 months; $3,500.

THYLLIS M. WILLIAMS, Washington, D. C.; *Methods for Representing Scientific Subject Matter in Information Searching Systems;* 1 year; $6,900.

UNIVERSITY OF WISCONSIN, Madison, Wis.; *Lectures on the History of Mechanics;* 1 year; $500.

The President's Committee on Scientists and Engineers

NATIONAL ACADEMY OF SCIENCES, Washington, D. C.; *The President's Committee on Scientists and Engineers;* 9 months; $85,000.

APPENDIX D

Fellowship Awards

Distribution of NSF Fellowships and Applicants by State of Residence Awarded in Fiscal Year 1957

Region and State	Applications received	Awards made
NORTHEAST		
Connecticut	69	25
Maine	21	5
Massachusetts	211	57
New Hampshire	12	3
New Jersey	148	47
New York	688	171
Pennsylvania	299	76
Rhode Island	24	7
Vermont	13	2
SOUTH		
Alabama	47	7
Arkansas	28	11
Delaware	17	4
District of Columbia	37	5
Florida	55	15
Georgia	44	7
Kentucky	44	8
Louisiana	45	4
Maryland	97	25
Mississippi	24	4
North Carolina	70	16
Oklahoma	50	8
South Carolina	22	4
Tennessee	43	11
Texas	109	23
Virginia	68	17
West Virginia	14	3
NORTH CENTRAL		
Illinois	283	87
Indiana	102	26
Iowa	69	16
Kansas	58	17
Michigan	143	42
Minnesota	96	25
Missouri	72	22
Nebraska	36	11
North Dakota	16	2
Ohio	163	44
South Dakota	19	3
Wisconsin	101	33
WEST		
Arizona	21	8
California	438	132
Colorado	45	11
Idaho	14	3
Montana	14	3
Nevada	2	0
New Mexico	22	6
Oregon	63	12
Utah	25	4
Washington	92	27
Wyoming	13	4
POSSESSIONS		
Alaska	7	3
Hawaii	12	2
Puerto Rico	5	1

Distribution of NSF Fellowship Awards by Year of Study and Field
Academic Year 1957–58

Field	Predoctoral			Postdoctoral (regular)	Senior postdoctoral	Science Faculty	Total
	First year	Intermediate	Terminal year				
Life sciences	47	101	68	44	26	25	311
Chemistry	57	65	63	22	9	22	238
Engineering	50	41	23	2	3	17	136
Earth sciences	9	21	11	4	1	1	47
Mathematics	33	40	13	16	6	21	129
Physics and astronomy	49	99	41	20	9	12	230
Physical sciences, general	.....	.....	.....	.....	.....	1	1
Convergent fields	.....	9	5	1	1	1	17
Total	245	376	224	[1] 109	[1] 55	100	1,109

[1] Includes 25 awards made in October 1956.

Names, Residences, and Fields of Study of Individuals Awarded National Science Foundation Fellowships for Fiscal Year 1957

ALABAMA

Predoctoral

KNIGHT, JAMES M., Mobile, Physics.
KNOPP, PAUL J., S. J., Spring Hill Station, Mathematics.
LAMPKIN, JULIA M., Tuscaloosa, Medical Sciences.
MANJARREZ, VICTOR M., S. J., Spring Hill, Mathematics.
RHODES, WILLIAM C., Anniston, Biochemistry.

Science Faculty

HUDSON, FRED M., Auburn, Engineering.
HUNTER, ROY, Jr., Birmingham, Zoology.

ARIZONA

Predoctoral

BALL, JAMES S., Tempe, Physics.
COOPER, CHARLES F., Tucson, Botany.
HAYDEN, JULIAN D., Jr., Tucson, Physics.
JUSTICE, KEITH E., Tucson, Zoology.
RAUCH, HERBERT E., Tucson, Engineering.
SHUTLER, MARY E., Tucson, Anthropology.

Regular Postdoctoral

FRIED, HERBERT M., Tucson, Physics.

Science Faculty

EVENSON, ADELAIDE E., Tucson, Microbiology.

ARKANSAS

Predoctoral

CARRUTH, GEORGE A.,[1] Charleston, Biochemistry.
CROSS, ROBERT A., Bauxite, Engineering.
EVERETT, WAYNE W., Benton, Biochemistry.
LEMING, HOWELL E., Fayetteville, Physics.
PAGE, LEROY E., Springdale, Engineering.
RODGERS, TOMMY A., Hot Springs, Chemistry.
STALLINGS, JOHN R., Jr., Morrilton, Mathematics.
WASSON, JOHN T., Springtown, Chemistry.
WILLIS, WILLIAM J., Fort Smith, Physics.

Regular Postdoctoral

CHOWNING, ANN, Little Rock, Anthropology.

Science Faculty

FELL, RALPH V., Magnolia, Agriculture.

CALIFORNIA

Predoctoral

APPLEQUIST, JON B., Berkeley, Chemistry.
ARNOLD, LAWRENCE J., Los Angeles, Mathematics.
AZAR, LEONARD, Berkeley, Engineering.
BAIRD, ALEXANDER K., El Cerrito, Earth Sciences.
BARTON, PATRICIA A., Alhambra, Microbiology.
BASS, HYMAN, Los Angeles, Mathematics.
BERKSON, EARL R., Los Angeles, Mathematics.
BLAIR, PHYLLIS B., Berkeley, Genetics.
BOSWELL, GEORGE A., Castro Valley, Chemistry.
BREDON, GLEN E., Sanger, Mathematics.
BROKAW, CHARLES J., El Segundo, Zoology.
BROSEMER, RONALD W.,[1] Oakland, Biochemistry.
BROWN, LOWELL S., Visalia, Physics.
CARPENTER, WAYNE R., Pomona, Chemistry.
CRAWLEY, PETER L., Pasadena, Mathematics.
DAYBELL, MELVIN D., Oceanside, Physics.
DE NEVERS, NOEL H., San Francisco, Engineering.
DE VOTO, RICHARD H., Palo Alto, Engineering.
DEWHIRST, KENNETH C., Tracy, Chemistry.
DOBYNS, HENRY F., Niles, Anthropology.
DONOVAN, PAUL F., Berkeley, Chemistry.
DRAKE, JOHN W.,[1] Pasadena, Microbiology.
EFRON, LEONARD, Glendora, Engineering.
FIELD, GEORGE F., Linden, Chemistry.
FONG, PAUL, San Francisco, Mathematics.
FUCHS, RONALD,[1] Altadena, Physics.
GILLETT, JAMES W., Berkeley, Biochemistry.
GIULIANO, CONCETTO R., Gardena, Chemistry.
GOLDSBOROUGH, JOHN P., Stanford, Physics.
HAHNE, GERHARD E., Alameda, Physics.
HALL, HAROLD R.,[1] Oildale, Engineering.
HAMILTON, WILLIAM F.,[1] II, Altadena, Physics.
HAND, LOUIS N., Menlo Park, Physics.
HANNA, MELVIN W.,[1] Van Nuys, Chemistry.
HARRIS, ROBERT E., Berkeley, Chemistry.
HOLLIDAY, DENNIS, Alhambra, Physics.
HUANG, LUC, Oakland, Physics.
HULTGREN, NEILEN W., Berkeley, Chemistry.
JOEL, CLIFFE D., Vista, Medical Sciences.
JORDAN, PETER C. H., Hollywood, Chemistry.
KALLIN, EVA M.,[1] Berkeley, Mathematics.
KELLY, BEATRICE L., Monterey Park, Microbiology.
LANGENBERG, DONALD N., Berkeley, Physics.
LATIMER, HOWARD L., Claremont, Genetics.
LUBLINER, JACOB, Los Angeles, Engineering.
LUNDBERG, RAYMOND E., Palo Alto, Engineering.
MACIEL, GARY E., Livermore, Chemistry.
MACMILLAN, ARCHIE J., Los Angeles, Engineering.
MARSHALL, J. HOWARD, III, Lake Arrowhead, Physics.
MAYFIELD, IVAN JEANNE, Chino, Zoology.
MCCONKEY, EDWIN H., Berkeley, Zoology.
MCCUEN, PETER A., Bakersfield, Engineering.
MCCUNE, DELBERT C., Saratoga, Botany.
MONK, JAMES D., Danville, Mathematics.
MORETTI, RICHARD L., San Bernardino, Zoology.
NANDI, JEAN, Solvang, Zoology.
NEIGHBOR, JAMES E.,[1] III, Lafayette, Physics.
NEVILLE, DONALD E.,[1] Los Angeles, Chemistry.
NIERLICH, DONALD P., Santa Monica, Biochemistry.
ORBACH, RAYMOND L., Los Angeles, Physics.

[1] Declined.

PARKER, BARBARA A., Los Angeles, Chemistry.
PARKER, EVELYN D., San Francisco, Biochemistry.
PARSONS, MARGARET C., Claremont, Zoology.
PICCOLINI, RICHARD J., Los Angeles, Chemistry.
PROSCHAN, FRANK, Sunnyvale, Mathematics.
PRUITT, WILLIAM E., Redwood City, Mathematics.
PURVES, WILLIAM K., Jr., Sacramento, Botany.
RADFORD, MARGARET R., Glendale, Biochemistry.
RAVEN, PETER H.,[1] San Francisco, Botany.
RICHARDS, E. GLEN, Berkeley, Biochemistry.
RICHARDS, L. WILLARD, Riverside, Chemistry.
RICHARDS, PAUL L., Riverside, Physics.
ROBERTSON, BALDWIN, Los Angeles, Physics.
ROYCE, EDWIN B., Pasadena, Physics.
SCOTT, PHEBE C., Oakland, Psychology.
SEDERHOLM, CHARLES H., Concord, Chemistry.
SHIRLEY, DAVID A., Berkeley, Chemistry.
SORENSON, JOHN L., Los Angeles, Anthropology.
STEIN, ELIZABETH K., Los Angeles, Microbiology.
STROMBOTNE, RICHARD L., Berkeley, Physics.
TAYLOR, HUGH P., Jr., Los Angeles, Earth Sciences.
TINDERHOLT, VICTOR E., Santa Monica, Genetics.
WEDDLE, ORVILLE H., Granada Hills, Zoology.
WEITZNER, HAROLD, San Francisco, Physics.
WERTHAMER, N. RICHARD,[1] Sherman Oaks, Physics.
WILCOX, WILLIAM R., Albany, Engineering.
WILLIAMS, FORMAN A., Pasadena, Engineering.
WILLIS, JOHN S., Pasadena, Zoology.
WILSON, DONALD M., Los Angeles, Zoology.
WILSON, GARTH H., Oakland, Engineering.

[1] Declined.

Regular Postdoctoral

ALLEN, DAVID W., Sierra Madre, Medical Sciences.
BAKER, GEORGE A., Jr., Davis, Physics.
BOTTINI, ALBERT T., Petaluma, Chemistry.
BRACKETT, THOMAS E.,[1] El Cerrito, Chemistry.
DICKEMAN, MILDRED, Los Altos, Anthropology.
DURBIN, RICHARD D., Los Angeles, Biochemistry.
FLANDERS, HARLEY, Berkeley, Mathematics.
FRENCH, GILBERT M.,[1] Pasadena, Psychology.
GASIOROWICZ, STEPHEN G., Albany, Physics.
GHIRARDELLI, ROBERT G.,[1] San Francisco, Chemistry.
HERSCHBACH, DUDLEY R.,[1] Aptos, Chemistry.
HOMMERSAND, MAX H., La Mesa, Botany.
JACOBSON, BARUCH S., Berkeley, Biophysics.
MALLORY, FRANK B.,[1] Pasadena, Chemistry.
MARGOLIN, PAUL,[1] Pasadena, Genetics.
MCMATH, VERNON E., Van Nuys, Earth Sciences.
RIDDELL, DOROTHY M., Berkeley, Anthropology.
SHERBY, OLEG D.,[1] Albany, Engineering.
SNOW, SIDNEY R.,[1] Los Angeles, Genetics.
SUPPES, PATRICK C., Stanford, Philosophy of Science.
WILCOX, LEE R., Menlo Park, Physics.
WOHLWILL, JOACHIM F., Berkeley, Psychology.

Senior Postdoctoral

BENSON, SIDNEY W., Beverly Hills, Chemistry.
BULLOCK, THEODORE H., Pacific Palisades, Zoology.
CLAYTON, RODERICK K., Carmel, Biochemistry.
CRANE, JULIAN C., Davis, Botany.
DAUBEN, WILLIAM G., Berkeley, Chemistry.
DAVIS, LEVERETT, Jr., Altadena, Physics.

KELLEY, JOHN L.,[1] Berkeley, Mathematics.
KIRKMAN, HADLEY, Stanford, Medical Sciences.
LORENZ, FREDERICK W., Davis, Zoology.
PARDEE, ARTHUR B., El Cerrito, Biochemistry.
PITELKA, FRANK A., Berkeley, Zoology.
TOLLESTRUP, ALVIN V., Altadena, Physics.

Science Faculty

FARRELL, EDWARD J., San Francisco, Mathematics.
LAMBERT, FRANK L., Los Angeles, Chemistry.
MCKILLOP, ALLAN A., Davis, Engineering.
MYSELS, KAROL J., Los Angeles, Chemistry.
RAUCH, STANLEY E., Santa Barbara, Mathematics.
SCHEFFEY, CHARLES F., Berkeley, Engineering.
SCOTT, VERNE H., Davis, Engineering.
TAUXE, GEORGE J., Pacific Palisades, Engineering.

COLORADO

Predoctoral

HARMS, JOHN C., Loveland, Earth Sciences.
IRWIN, CYNTHIA C., Morrison, Anthropology.
KELLOGG, HAROLD E., Arvada, Earth Sciences.
NAZY, JOHN R., Denver, Chemistry.
SPENCER, ALBERT W., Fort Collins, Zoology.
VIERECK, ELEANOR G., Boulder, Zoology.
WELSH, ROBERT E., Denver, Physics.

Regular Postdoctoral

HAROLD, FRANKLIN M., Denver, Biochemistry.

Senior Postdoctoral

WEBER, WILLIAM A., Boulder, Botany.

Science Faculty

SMITH, DONN L., Denver, Medical Sciences.
STICKLER, WILLIAM C., Denver, Chemistry.

CONNECTICUT

Predoctoral

AHEARNE, JOHN F.,[1] New Britain, Physics.
BRIGGS, THOMAS, South Norwalk, Medical Sciences.
CHURCHILL, LINDSEY, C., Jr., Meriden, Mathematical Sociology.
CONRON, GREGORY F.,[1] New Canaan, Engineering.
DRANOFF, JOSHUA, S.,[1] Bridgeport, Engineering.
FARNHAM, ANN E., Broad Brook, Microbiology.
JARNAGIN, RICHARD C., New Haven, Chemistry.
MCCOLM, DOUGLAS W., New Haven, Physics.
MEIGS, ROBERT A., Newington, Medical Sciences.
MERMIN, N. DAVID,[1] New Haven, Physics.
MILLER, JOHN H., New Haven, Botany.
STEVENSON, KENNETH K., Berlin, Chemistry.
STILLINGER, FRANK H., Jr., New Haven, Chemistry.
TANENBAUM, B. SAMUEL, New Haven, Physics.
TIFFT, WILLIAM G., Seymour, Astronomy.
WAGNER, ALVIN, Stamford, Zoology.
WHITE, JOHN A., New Haven, Physics.

Regular Postdoctoral

GILBERT, WALTER, Westport, Physics.
GOLDSTEIN, MELVIN J., New Haven, Chemistry.
PECK, HARRY D., Jr.,[1] Middletown, Microbiology.
REUSCH, WILLIAM H., Greenwich, Chemistry.

Senior Postdoctoral

BROWDER, FELIX E., New Haven, Mathematics.
FITCH, FREDERIC B.,[1] New Haven, Mathematics.

Science Faculty

ROSENBAUM, ROBERT A., Middletown, Mathematics.
SEASE, JOHN W., Portland, Chemistry.

[1] Declined.

DELAWARE

Predoctoral

ANDERSON, HOWARD W., Wilmington, Engineering.
HARWITZ, MITCHELL, Wilmington, Mathematical Economics.
JENNINGS, U. DUANE, Wilmington, Engineering.
ROMANO, RICHARD C., Newark, Engineering.

DISTRICT OF COLUMBIA

Predoctoral

DANTE, WILLIAM M.,[1] Physics.
EHRMAN, JOHN R., Physics.
HOFFELD, DONALD R., Psychology.
PRESNAL, DEAN C., Earth Sciences.

Science Faculty

BUTCHER, GEORGE H., Mathematics.

FLORIDA

Predoctoral

BLESS, ROBERT C., Gainesville, Astronomy.
BROOKS, RODNEY A., Miami, Physics.
DURRILL, PRESTON L., Fort Lauderdale, Engineering.
FOX, EVELYN, Miami Beach, Physics.
HUBBARD, PAUL S., Jr., St. Petersburg, Physics.
IRWIN, CAROL A., Jacksonville, Anthropology.
MORRILL, JOHN B., Tallahassee, Zoology.
RAMSPOTT, LAWRENCE D.,[1] Neptune Beach, Earth Sciences.
SAWYER, DONALD A., Gainesville, Engineering.
WINTERS, HERBERT H., Orlovista, Earth Sciences.

Regular Postdoctoral

MILLON, RENE F., Hialeah, Anthropology.
SCHRIEFFER, JOHN R., Eustis, Physics.
WADSWORTH, DONALD VAN Z.,[1] Coral Gables, Earth Sciences.

Science Faculty

MCCLAIN, HOWARD, Jr., Tallahassee, Medical Sciences.
SCHWEYER, HERBERT E., Gainesville, Engineering.

GEORGIA

Predoctoral

DUNLAP, JULIAN L., La Grange, Physics.
HOWE, JOHN A., Blue Ridge, Chemistry.
HUGHES, NORMAN, East Point, Zoology.
TOLBERT, MARY G., Comer, Zoology.

Senior Postdoctoral

ODUM, EUGENE P., Athens, Zoology.

Science Faculty

CASEMAN, AUSTIN B., Atlanta, Engineering.
HERREMAN, HAROLD M., Atlanta, Physics.

IDAHO

Predoctoral

NIELSON, CLAIR W., Pocatello, Physics.
NORGORD, JOHN T., Moscow, Engineering.
WILLMORTH, JOHN H., Boise, Engineering.

ILLINOIS

Predoctoral

ARONSON, ARTHUR I., Champaign, Microbiology.
BARON, ROBERT E.,[1] Chicago, Physics.
BAUR, MARIO E., Chicago, Chemistry.
BECKMAN, TAD A.,[1] Wilmette, Chemistry.
BJORKEN, JAMES D., Park Ridge, Physics.
BODINE, ALAN G., Macomb, Physics.
BREWER, RICHARD, Murphysboro, Zoology.
BUTLER, DONALD C., Highland Park, Psychology.
CAIRNS, ELTON J., Chicago, Engineering.
COLEMAN, SIDNEY R., Chicago, Physics.
COLLMAN, JAMES P., Urbana, Chemistry.
DECKER, DANIEL L., Champaign, Physics.
DU FRESNE, EUGENE R., Chicago, Chemistry.
EDWARDS, HAROLD M., Jr., Champaign, Mathematics.
FILSON, DON P., Chicago, Chemistry.
FOODEN, JACK, Chicago, Zoology.
FRAENKEL, DAN G., Urbana, Medical Sciences.

[1] Declined.

FREIFELDER, DAVID M., Waukegan, Biophysics.
GAGGIOLI, RICHARD A., Highwood, Engineering.
GHOLSON, ROBERT K., Champaign, Biochemistry.
GINSBERG, DONALD M., Chicago, Physics.
GOLDBERG, JAY M., Chicago, Psychology.
GOODMAN, GORDON L., Riverside, Chemistry.
HARRISON, MICHAEL J., Chicago, Physics.
HARTZELL, GORDON E., Champaign, Chemistry.
HATTENDORF, EDWIN R.,[1] West Chicago, Engineering.
HILL, ROBERT N., Evanston, Physics.
HOGAN, JERRY A., Chicago, Psychology.
HUNDLEY, RICHARD O., Joliet, Physics.
JOSEPH, DAVID W., Wheaton, Physics.
KAISER, EMIL T., Chicago, Chemistry.
KALTENBRONN, JAMES S., New Baden, Chemistry.
KERMICLE, JERRY L., Dundas, Genetics.
KERTESZ, DENIS J., Glenview, Chemistry.
KUST, ROGER N.,[1] Villa Park, Chemistry.
LLOYD, RONALD M., Oak Park, Earth Sciences.
MCCARROLL, BRUCE, Chicago, Chemistry.
MCMICHAEL, KIRK D., Ingleside, Chemistry.
MINN, FREDRICK L., Waukegan, Chemistry.
MODESITT, GEORGE E., Urbana, Physics.
MRAZEK, ROBERT V., Elmhurst, Engineering.
OLOFSON, ROY A., Chicago, Chemistry.
PAULUS, HENRY P., Winnetka, Biochemistry.
QUAY, PAUL M., S. J., Oak Park, Physics.
RENICK, REBECCA J., Manhattan, Chemistry.
RESING, HENRY A., Chicago, Chemistry.
REYNOLDS, JOHN C., Glen Ellyn, Physics.
ROGERS, KENDAL T., Urbana, Physics.
SCHLESSINGER, DAVID, Chicago, Biochemistry.
SWARTZ, LESLIE G., Western Springs, Zoology.
TALBOTT, RICHARD L., Elmhurst, Chemistry.
TILLSON, MARTHA A., La Grange, Zoology.
TOBEY, STEPHEN W., Chicago, Chemistry.
TROZZOLO, ANTHONY M., Chicago, Chemistry.
VEAZIE, AUDREY E., Chicago, Chemistry.
WALL, ROBERT E., Mulberry Grove, Chemistry.
WARDEN, JOHN C., Danville, Botany.
WEINER, DANIEL, Chicago, Physics.
WOLF, JOSEPH A., Chicago, Mathematics.
YOUNGDAHL, CARL K., Chicago, Mathematics.
YUND, RICHARD A., Farina, Earth Sciences.
ZIMMERMAN, STEVEN B., Chicago, Biochemistry.

Regular Postdoctoral

BACKUS, GEORGE E.,[1] Chicago, Physics.
BROWN, BRUCE E., Chicago, Earth Sciences.
EBERSTEIN, ARTHUR, Chicago, Biophysics.
GELLER, DAVID M., Oak Park, Medical Sciences.
HANRAHAN, ROBERT J., Woodstock, Chemistry.
LLOYD, MONTE B., Chicago, Agriculture.
NELSON, J. EDWARD, Chicago, Mathematics.
NERODE, ANIL, Chicago, Mathematics.
NOSANOW, LEWIS H., Chicago, Chemistry.
REIF, MILDRED, Chicago, Physics.
RICHEY, HERMAN G., Chicago, Chemistry.
ROTHMAN, FRANK G., Chicago, Chemistry.
SCHULTZ, THEODORE D., Glencoe, Physics.
THOMAS, RICHARD S., Champaign, Biophysics.
WOOD, GALEN T., Chicago, Physics.
ZUBAY, GEOFFREY L., Chicago, Biochemistry.

Senior Postdoctoral

BASCOM, WILLIAM R., Evanston, Anthropology.

[1] Declined.

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BORDWELL, FREDERICK G., Evanston, Chemistry.
FRAENKEL, GOTTFRIED S., Urbana, Zoology.
FULTZ, DAVE, Chicago, Earth Sciences.
HALVORSON, HALVOR O.,[1] Urbana, Microbiology.
JOHNSON, ROBERT E., Urbana, Medical Sciences.
KELLEY, JOHN C., Carbondale, Anthropology.

Science Faculty

BOWER, JOHN E., De Kalb, Chemistry.
DILKS, ELEANOR, Normal, General Biology.

INDIANA

Predoctoral

CHILDS, CANNING R., Jr., Indianapolis, Chemistry.
DODD, JAMES R., Bloomington, Earth Sciences.
FOX, SISTER M. ALICE MARIE, South Bend, Zoology.
FRAZER, WILLIAM R., Indianapolis, Physics.
HUEBER, FRANCIS M., Indianapolis, Earth Sciences.
HUNTER, RALPH E., Bloomington, Earth Sciences.
JENKINS, THOMAS M., Indianapolis, Mathematics.
MEDITCH, JAMES S.,[1] Indianapolis, Engineering.
MELCHIOR, MICHAEL T., Fort Wayne, Chemistry.
PRAIRIE, RICHARD L., Fort Wayne, Biochemistry.
RAPER, ODELL F., Bloomington, Chemistry.
RAY, CLAYTON E., Indianapolis, Earth Sciences.
SANE, JAMES O., Hammond, Engineering.
SCOFIELD, JAMES H., Chesterton, Physics.
SHIELDS, JAMES E., Marion, Biochemistry.
STEWART, THOMAS E., South Bend, Mathematics.
STILLER, MARY L., Connersville, Botany.
VOUGHT, ELDON J., South Bend, Mathematics.
WILT, FRED H., Nappanee, Zoology.

[1] Declined.

Regular Postdoctoral

BURG, RICHARD W., Fort Wayne, Biochemistry.
CLELAND, WALLACE, Bloomington, Biochemistry.

Senior Postdoctoral

BENZER, SEYMOUR, West Lafayette, Biophysics.
ELIEL, ERNEST L., South Bend, Chemistry.

Science Faculty

LANGE, LESTER H., Valparaiso, Mathematics.
POSTLETHWAIT, SAMUEL N., Lafayette, Botany.
SHUPE, JOHN W., West Lafayette, Engineering.

IOWA

Predoctoral

ANDERSON, WILLIAM J., Ames, Engineering.
BAKER, BILLY R.,[1] Eldon, Engineering.
CHRISTENSEN, STANLEY H., Ames, Physics.
COOPERRIDER, TOM S., Iowa City, Botany.
GRAHAM, JOHN B., Brooklyn, Engineering.
KERR, NORMAN S., Charles City, Microbiology.
RENEKER, DARRELL H., Birmingham, Physics.
ROBERTS, WALDEN K., Lamoni, Biochemistry.
WATSON, PATTY JO, Sheffield, Anthropology.
WILBOIS, ANNETTE D., Des Moines, Genetics.
WOOLDRIDGE, CHARLES E., Mason City, Engineering.

Regular Postdoctoral

ENGLER, JEAN A., Mason City, Psychology.

Senior Postdoctoral

ARONOFF, SAM, Ames, Biochemistry.

Science Faculty

JESSEN, MARVIN P., Des Moines, Zoology.
RIGGS, PHILIP S., Des Moines, Astronomy.

SCHURRER, AUGUSTA L., Cedar Falls, Mathematics.

KANSAS

Predoctoral

BAKIS, RAIMO, Sterling, Physics.
COLWELL, JOHN E., Bellaire, Chemistry.
DALY, HOWELL V., Jr., Lawrence, Zoology.
FARRAR, THOMAS C., Wichita, Chemistry.
HALL, BENJAMIN D., Lawrence, Chemistry.
HALL, JOHN B., Mission, Medical Sciences.
HORR, DAVID A.,[1] Lawrence, Anthropology.
JACKSON, THOMAS C., Hutchinson, Engineering.
RETTENMEYER, CARL W., Lawrence, Zoology.
RICHERT, A. STUART, Wichita, Physics.
ROGERS, GARY B., Manhattan, Engineering.
SCHLAGER, GUNTHER, Lawrence, Zoology.
SINKHORN, RICHARD D., Wichita, Mathematics.
SOMMER, WARREN T., Manhattan, Physics.
STRICKLER, STEWART J., Hutchinson, Chemistry.

Science Faculty

BRAYFIELD, ARTHUR H., Manhattan, Psychology.
ELLIOTT, IRVIN W., Newton, Chemistry.

KENTUCKY

Predoctoral

CANTRILL, JAMES E., Lexington, Chemistry.
COOK, MAURICE G., Hatton, Agriculture.
LIND, JOHN E., Jr., Louisville, Chemistry.
RAGLAND, JOHN L., Beaver Dam, Agriculture.
THOMAS, WILLIAM A., McKee, Earth Sciences.

Senior Postdoctoral

WILEY, RICHARD H., Louisville, Chemistry.

Science Faculty

LEVEY, GERRIT, Berea, Chemistry.
WALLER, M. CONCETTA, Louisville, Chemistry.

LOUISIANA

Predoctoral

HOWE, HERBERT J., Baton Rouge, Earth Sciences.
LINDERHOLM, CARL E., Baton Rouge, Mathematics.

Science Faculty

VLIET, DANIEL H., New Orleans, Engineering.
WILLIS, PHYLLIDA M., New Orleans, Chemistry.

MAINE

Predoctoral

BERKELMAN, KARL, Lewiston, Physics.
COMMERFORD, SPENCER L., Belfast, Medical Sciences.
JENNESS, JONATHAN, North Bridgeton, Anthropology.
LARY, EDMUND C., West Scarborough, Engineering.
SILVER, IRVING R., Portland, History of Science.

MARYLAND

Predoctoral

AIKEN, RICHARD T., Baltimore, Engineering.
COFFMAN, CHARLES V., Hagerstown, Mathematics.
CONLEY, JAMES W., Hyattsville, Engineering.
CURTIS, EDWARD B., Annapolis, Mathematics.
DORFMAN, JAY R., Baltimore, Chemistry.
HAUK, ROSALIND, Chevy Chase, Medical Sciences.
HIRSHFELD, DAVID S., Baltimore, Engineering.
HOROWITZ, LEONARD M.,[1] Baltimore, Psychology.
JOHNSON, BETSEY W., Chevy Chase, Medical Sciences.
KAUFMANN, JOHN H.,[1] Towson, Zoology.
NILES, PATRICIA A., Kingsville, Psychology.
ROTBERG, IRIS C., Adelphi, Psychology.

[1] Declined.

SHARNOFF, MARK, Chevy Chase, Physics.
SIGER, ALVIN, Baltimore, Biochemistry.
TAEUBER, KARL E., Hyattsville, Demography.
WHITAKER, STEPHEN, Elkton, Engineering.
WHITLOCK, HOWARD W., Jr., University Park, Chemistry.
WILLIAMS, RICHARD B., Edgewood, General Biology.
WILLIS, EDWIN O., Baltimore, Zoology.

Regular Postdoctoral

ISAACS, JAMES P.,[1] Baltimore, Medical Sciences.
SPENCER, RICHARD P., Silver Spring, Biochemistry.
WARNHOFF, EDGAR W., Bethesda, Chemistry.

Senior Postdoctoral

PARK, JAMES T., Silver Spring, Biochemistry.

Science Faculty

ALLEN, REDFIELD W., Silver Spring, Engineering.
CHESSIN, PAUL L., Baltimore, Mathematics.

MASSACHUSETTS

Predoctoral

ABBOTT, ROSE MARIE S.,[1] Northampton, Botany.
AVERELL, JOHN P., Roslindale, Physics.
BAYM, GORDON A., Pittsfield, Physics.
BRILLIANT, MARTIN B., Boston, Engineering.
COOPER, BERNARD R., Hyde Park, Physics.
DANIELS, GERALD M., Jamaica Plain, Physics.
DIXON, WILLIAM B., Fall River, Chemistry.
EIGNER, JOSEPH, Swampscott, Chemistry.
EVENS, LEONARD, Brookline, Mathematics.
FELDMAN, CHARLES L., Brookline, Engineering.
FESSEDEN, RICHARD W., North Amherst, Chemistry.
GOLD, L. PETER, Brockton, Chemistry.
GOSSARD, ARTHUR C., Quincy, Physics.
HILFER, S. ROBERT, Amherst, Zoology.
HOBEY, WILLIAM D., Peabody, Chemistry.
HORVITZ, PAUL M., Brookline, Mathematical Economics.
HOUGEN, JON T., Watertown, Chemistry.
HOWARD, WEBSTER E., Jr., Winthrop, Physics.
HUBERT, JOHN F., Dover, Earth Sciences.
JOYNER, WILLIAM B., Cambridge, Earth Sciences.
KOLENKOW, ROBERT J., Cambridge, Physics.
LANDAUER, THOMAS K., Cambridge, Psychology.
LEMAIRE, NORMAND A., New Bedford, Chemistry.
LIANIDES, SYLVIA P., Brighton, Medical Sciences.
MCGOFF, DAVID J., Somerville, Engineering.
MUCKENHOUPT, BENJAMIN, Newton Highlands, Mathematics.
OFENGAND, JAMES, Taunton, Microbiology.
REYNOLDS, DAVID V., Attleboro, Psychology.
SHAKIN, CARL, Somerville, Physics.
STEKLER, HERRMANN O.,[1] Worcester, Mathematical Economics.
THIESSEN, WILLIAM E., Boston, Chemistry.
TUGENDHAT, BEATRICE, Webster, Psychology.
WAHLIG, MICHAEL A., Boston, Physics.
WATERS, EDWARD L., Peabody, Chemistry.
WEBER, ROBERT, North Reading, Physics.
WHARTON, LENNARD, Brookline, Chemistry.
WHITE, ROBERT W., Somerville, Chemistry.
WILLIAMS, DAVID C., Belmont, Chemistry.
WILSON, KENNETH G., Concord, Physics.

Regular Postdoctoral

CURRY, GEORGE M., Groton, Botany.
DAVIS, MARGARET B., Cambridge, Botany.
JOHNSON, KENNETH A., Cambridge, Physics.
LA TOURRETTE, JAMES T., Cambridge, Physics.
LIVINGSTONE, FRANK B., Winchester, Anthropology.
MCKEAN, HENRY P., Jr.,[1] Beverly Farms, Mathematics.

[1] Declined.

Senior Postdoctoral

BISPLINGHOFF, RAYMOND, Wellesley Hills, Engineering.
BLOCH, KONRAD E., Lexington, Biochemistry.
GIMBUTAS, MARIJA, Boston, Anthropology.
POUND, ROBERT V.,[1] Arlington, Physics.
RESWICK, JAMES B., Wellesley, Engineering.
ROBY, THORNTON B., Lexington, Psychology.
STONE, DAVID, Worcester, Biochemistry.
TATE, JOHN T.,[1] Cambridge, Mathematics.
WEISSKOPF, VICTOR F., Cambridge, Physics.

Science Faculty

CROCKETT, WALTER H., Worcester, Mathematics.
KLEIN, GEORGE, Cambridge, Mathematics.
WINTER, STEPHEN S., Belmont, Chemistry.

MICHIGAN

Predoctoral

ALLERTON, SAMUEL E.,[1] Kalamazoo, Medical Sciences.
BISQUE, RAMON E., Iron River, Earth Sciences.
BOUWSMA, WARD D., Grand Rapids, Mathematics.
BRAKE, JOHN R., Stanton, Agricultural Economics.
BRINEY, ROBERT E., Muskegon, Mathematics.
BROOMFIELD, CLARENCE A., Mt. Morris, Biochemistry.
COATS, KEITH H., Ann Arbor, Engineering.
GARLAND, HOWARD, Detroit, Mathematics.
GIFFELS, CARL A., Dearborn, Physics.
GOODE, FRANK M., Ann Arbor, Mathematics and Psychology.
GRAESSLEY, WILLIAM W., Ann Arbor, Engineering.
HAZARD, EVAN B.,[1] Pinckney, Zoology.
HEATWOLE, HAROLD F., Ann Arbor, Zoology.
HEIN, GEORGE E., Ann Arbor, Chemistry.
KNOLL, GLENN F.,[1] Frankenmuth, Engineering.
KRETZSCHMAR, ALICE M., Detroit, Mathematics.
LOVETT, JAMES S., East Lansing, Botany.
MACK, LAWRENCE R., Plymouth, Engineering.
MOHR, CHARLES M., South Haven, Engineering.
MOHR, WILLIAM D., South Haven, Engineering.
NELSON, FREDERIC F., Grand Rapids, Chemistry.
NICHOLS, WILLIAM H.,[1] S. J., Detroit, Physics.
PLOURDE, GAIL R.,[1] Norway, Chemistry.
SCHRIBER, THOMAS J., Muskegon, Engineering.
SHIELDS, PAUL C., South Haven, Mathematics.
SPENCER, JOHN L., Ann Arbor, Chemistry.
SPITZER, DONALD P., Bridgman, Chemistry.
STASHEFF, JAMES D., Ann Arbor, Mathematics.
STENGER, ROBERT A., Midland, Chemistry.
VANDER VEN, NED S., Clawson, Physics.
WOZNICK, BENJAMIN J., Jr., Grand Rapids, Physics.
YOUNGDALE, GILBERT A., Detroit, Chemistry.
ZINNES, JOSEPH L., South Lyon, Psychology and Physics.

Regular Postdoctoral

LEWIS, PEIRCE F., Ann Arbor, Earth Sciences.
MEYER, WALTER L., Ann Arbor, Chemistry.
STEVENS, JOSEPH C.,[1] Grand Rapids, Psychology.

Senior Postdoctoral

LUTTINGER, JOAQUIN M., Ann Arbor, Physics.

Science Faculty

GHERING, SISTER MARY V., Grand Rapids, Chemistry.
GRUEN, FRED M., Olivet, Chemistry.
SKINNER, CHARLES E., Alma, Chemistry.

[1] Declined.

SOWUL, JEROME G., Royal Oak, Mathematics.
SPURR, STEPHEN H., Ann Arbor, Agriculture.

MINNESOTA

Predoctoral

ACKERBERG, ROBERT C., St. Louis Park, Engineering.
BURGESS, PHYLLIS E.,[1] Moorhead, Zoology.
ELIASON, MORTON A., Moorhead, Chemistry.
ERICKSON, GLEN W., Minneapolis, Physics.
FAWCETT, MARK S., Winona, Chemistry.
HOLMES, JOHN C., South St. Paul, Zoology.
JUNGAS, ROBERT L., Mountain Lake, Medical Sciences.
LARSON, DAVID C., Cloquet, Physics.
LARSON, JANE, Minneapolis, Chemistry.
MELIN, JOHN A., St. Paul, Chemistry.
MILLER, FRANK C.,[1] Little Falls, Anthropology.
MOFFET, ALAN T., Rochester, Physics.
OSBORN, JAMES H.,[1] Winona, Chemistry.
PEARSON, JAMES J.,[1] Minneapolis, Physics.
READY, JOHN F., Minneapolis, Physics.
RICHARDS, J. IAN, St. Paul, Mathematics.
ROISELAND, DONALD S., South St. Paul, Physics.
SCOTT, PAUL C., Minneapolis, Chemistry.
SWEENEY, CAROL C., Winnebago, Chemistry.
WITTRY, SISTER ESPERANCE, C. S. J., St. Paul, Zoology.
YOUNGQUIST, MARY J., Minneapolis, Chemistry.

Regular Postdoctoral

GRUNBAUM, BENJAMIN W., Minneapolis, Biochemistry.

Senior Postdoctoral

RICHARDS, A. GLENN,[1] St. Paul, Zoology.

Science Faculty

GARDNER, GERARD, Winona, Physics.
LARSON, WILLIAM D., St. Paul, Chemistry.

[1] Declined.

MISSISSIPPI

Predoctoral

CERNY, JOSEPH, III,[1] Oxford, Chemistry.
CROW, TERRY T., Amory, Physics.
MANGUM, BILLY W., Mize, Chemistry.

Science Faculty

NOBLES, WILLIAM L., Oxford, Chemistry.

MISSOURI

Predoctoral

ALT, DAVID D., Kirkwood, Earth Sciences.
CANTWELL, JOHN C., St. Louis, Mathematics.
DAWSON, RICHARD G., Kansas City, General Biology.
FULLER, ROBERT G., Rolla, Physics.
GERBER, CARL J., St. Louis, Medical Sciences.
GILLESPIE, ROBERT W., Kansas City, Mathematical Economics.
GORMAN, C. DAVID, Springfield, Mathematics.
KLOCK, PAUL W., St. Louis, Engineering.
LARSON, JAMES D., Independence, Physics.
MEAD, C. ALDEN,[1] Webster Groves, Chemistry.
MONTGOMERY, DAVID C., Milan, Physics.
PITTMAN, WILLIAM H., Columbia, Chemistry.
PRATT, RICHARD L.,[1] Jefferson City, Mathematics.
ROE, BYRON P., Olivette, Physics.
SCHANUEL, STEPHEN H., Kirkwood, Mathematics.
THOMPSON, JOHN G., Jefferson City, Mathematics.
WIESMEYER, HERBERT, St. Louis, Microbiology.
YOUNG, CHARLES W., Kirkwood, Agriculture.

Science Faculty

CHUBBUCK, EDWIN R., Hamilton, Engineering.
EDSON, FRANK G., Liberty, Chemistry.
ELLIOTT, H. MARGARET, St. Louis, Mathematics.
HALL, THOMAS S., St. Louis, General Biology.

MONTANA

Predoctoral

HILL, CLIFFORD W., Bozeman, Zoology.
JORGENSON, DALE W.,[1] Helena, Mathematical Economics.
POIRIER, JOHN A., Harlowton, Physics.

NEBRASKA

Predoctoral

CHRISTENSEN, RICHARD M.,[1] Miller, Earth Sciences.
DOMINGO, JOHN J., Weeping Water, Physics.
EICHER, DON L., Lincoln, Earth Sciences.
HAYES, JOHN B., Omaha, Earth Sciences.
HUPP, EUGENE W.,[1] Norfolk, Zoology.
JENSEN, DONALD D., Osceola, Psychology.
LOWELL, JAMES D., Lincoln, Earth Sciences.
SCHELKOPF, RUSSELL L., Geneva, Zoology.
SHUEY, ELDON W., Crab Orchard, Microbiology.
VAN VLECK, LLOYD D., Clearwater, Agriculture.
WRIGHT, CHARLES R. B., Lincoln, Mathematics.

NEW HAMPSHIRE

Predoctoral

JOHNSON, FREDERIC A., Concord, Chemistry.
WOLFENDEN, RICHARD V., Hanover, Zoology.

Regular Postdoctoral

FITTS, DONALD D., Keene, Chemistry.

NEW JERSEY

Predoctoral

ANDERSEN, KENNETH K., Fords, Chemistry.
BALDESCHWIELER, JOHN D., Cranford, Chemistry.
BLAKER, J. WARREN, Rutherford, Chemistry.
BROWN, W. STANLEY, Lawrenceville, Physics.
BROWNE, GERARD M., Jersey City, Physics.
CASSIDY, WILLIAM A., Roselle Park, Earth Sciences.
CIECIUCH, RONALD F. W., Jersey City, Chemistry.
CLARK, ALVIN J., Morristown, Biochemistry.
D'HEEDENE, ROBERT N., New Vernon, Mathematics.
DOLOTTA, THEODORE A., Vineland, Engineering.
DONNELLY, THOMAS W., Princeton, Earth Sciences.
DRESHER, SIDNIE M., Hackensack, Mathematics.
FEDERBUSH, PAUL G., Newark, Physics.
FLETCHER, JOHN G., Princeton, Physics.
FORER, ARTHUR H., Trenton, Zoology.
GOEBEL, CHARLES V., Jr., Harrington Park, Chemistry.
GOODYEAR, WILLIAM F., New Brunswick, Chemistry.
HEARST, JOHN E., East Orange, Chemistry.
HENRY, RICHARD W., Maplewood, Physics.
HUFNAGEL, ROBERT E., Pompton Plains, Engineering.
LARSEN, DAVID M., Hawthorne, Physics.
LEMAL, DAVID M., Fanwood, Chemistry.
LITVAK, MARVIN M., East Orange, Physics.
MATHER, WILLIAM B., Jr., Princeton, Chemistry.
MCGILL, GEORGE E., Princeton, Earth Sciences.
MILLER, BARRY,[1] Passaic, Chemistry.
O'BRIEN, PAUL J., Haddonfield, Biochemistry.
REINKEN, DONALD L., Plainfield, Mathematics.
ROSEN, GERALD H., Teaneck, Physics.
RUSCH, WILLARD V., Lambertville, Engineering.
RYERSON, GEORGE D., New Providence, Chemistry.
SAGAN, CARL E., Rahway, Astronomy.
SCHNITZER, HOWARD J., Newark, Physics.
STRUCK, CHARLES W., Hightstown, Chemistry.
VAUGHAN, WORTH E., Tenafly, Chemistry.
WEYMANN, RAY J., Princeton, Astronomy.
WILLEY, ROBERT B., Red Bank, Zoology.
ZANET, PAUL M., Clifton, Chemistry.

Regular Postdoctoral

BROWER, JANE VAN ZANT, Madison, Zoology.
SHIELDS, GEORGE S.,[1] Ridgewood, Medical Sciences.
SWAN, RICHARD G., Boonton, Mathematics.
WEINBERG, STEVEN,[1] Princeton, Physics.
WEINER, IRWIN M., New Egypt, Medical Sciences.

Senior Postdoctoral

BARNES, RODERICK A., Middlebush, Chemistry.
PINES, DAVID, Princeton, Physics.

Science Faculty

BAKER, E. G. STANLEY, Madison, General Biology.
STIVALA, SALVATORE S., Fair Lawn, Chemistry.

NEW MEXICO

Predoctoral

COOPER, JAMES A., Albuquerque, Engineering.
LAUBER, JEAN, Albuquerque, Zoology.
PIERCE, ALLAN D., Las Cruces, Physics.
SCHMITT, HARRISON H.,[1] Silver City, Earth Sciences.
SWAIN, GEORGE R., Albuquerque, Engineering.

Science Faculty

GREEN, JOHN R., Sandoval, Physics.

NEW YORK

Predoctoral

ADELBERG, ARNOLD M., Brooklyn, Mathematics.
ANDREADES, SAM, White Plains, Chemistry.
BARD, ALLEN J., Bronx, Chemistry.
BARRY, THOMAS W., Ithaca, Zoology.
BAUER, VICTOR J., White Plains, Chemistry.
BERKOWITZ, LEONARD, Brooklyn, Engineering.
BERSOHN, MALCOLM, New York, Chemistry.
BIENENSTOCK, ARTHUR I., New York, Physics.
BLOOM, DAVID M., New York, Mathematics.
BOCK, WALTER J., Woodhaven, Zoology.
BOIKESS, ROBERT S., Brooklyn, Chemistry.
BRANDT, PETER W., New York, Engineering.
BYRNE, CHARLES J., Jr., Albany, Engineering.
CAHN, ROBERT D.,[1] Great Neck, Zoology.
CASSIE, ROBERT M., Lowville, Earth Sciences.
CHASE, STEPHEN U., New York, Mathematics.
CHINOWSKY, STANLEY, Brooklyn, Engineering.
COHEN, RICHARD L., Brooklyn, Physics.
COHEN, WILLIAM C., Brooklyn, Engineering.
CONTI, JAMES J., Brooklyn, Engineering.
DICK, STANLEY, Brooklyn, Microbiology.
DOLEN, RICHARD,[1] New York, Physics.
DUBNAU, DAVID A., Brooklyn, Zoology.
ECKERT, ROGER O., Bronx, Zoology.
ERNST, FREDERICK J., Jr., Ardsley, Physics.
FAGAN, JOHN J., Ridgewood, Earth Sciences.
FALB, PETER L., Brooklyn, Mathematics.
FEIN, ARTHUR, Brooklyn, Engineering.
FELDMAN, MARTIN, Brooklyn, Physics.
FERZIGER, JOEL H., Brooklyn, Engineering.
FLINT, OLIVER S., Jr., Ithaca, Zoology.
FREDKIN, DONALD R.,[1] New York, Mathematics.
FRIEDMAN, MORTON H.,[1] New York, Engineering.
FUDGE, MOLLY W., Manlius, Zoology.
FURSTENBERG, HARRY, New York, Mathematics.
GALLANT, JONATHAN A., Mount Vernon, Zoology.
GARDINER, WILLIAM C., Niagara Falls, Chemistry.
GELLER, MURRAY, Brooklyn, Chemistry.
GILINSKY, VICTOR, New York, Physics.
GLASHOW, SHELDON L., New York, Physics.
GOLDBERG, ABRAHAM, Staten Island, Physics.
GRIFFITHS, ROBERT B., New York, Physics.
GROSS, CHARLES G.,[1] Brooklyn, Zoology.

[1] Declined.

HAFS, HAROLD D., Ithaca, Agriculture.
HARRINGTON, DAVID R., North Tonawanda, Physics.
HARRIS, MORTON E., Brooklyn, Mathematics.
HARRIS, THOMAS M., Lockport, Chemistry.
HELFAND, EUGENE, Brooklyn, Chemistry.
HERMES, MATTHEW E., St. Albans, Chemistry.
HORING, NORMAN J., Brooklyn, Physics.
HOROWITZ, EDWIN B., Jamaica, Biophysics.
HORRIGAN, FRANK A., New Rochelle, Physics.
IDDINGS, CARL K., Manhasset, Physics.
JAMES, ESTELLE, Brooklyn, Mathematical Economics.
JANOFF, AARON, Bronx, Zoology.
KABACK, STUART M., Brooklyn, Chemistry.
KADANOFF, LEO P., New York, Physics.
KAGAN, EILEEN K., Riverdale, Psychology.
KAHN, DANIEL S., Brooklyn, Mathematics.
KAHN, DONALD W., Rockaway Beach, Mathematics.
KAISER, ROBERT, New York, Engineering.
KATZ, THOMAS, J., Forest Hills, Chemistry.
KATZMAN, MARCIA H., Forest Hills, Genetics.
KAYE, NANCY W., New York, Zoology.
KLEIN, MILES V., Ithaca, Physics.
KLOTZ, TILLA S., New York, Mathematics.
KRISHER, LAWRENCE C., Livonia, Chemistry.
KURLAND, CHARLES G., Great Neck, Genetics.
LAMBERT, LORETTA, North Bellmore, Medical Sciences.
LEIBOWITZ, GERALD M., New York, Mathematics.
LEVIEN, ROGER E., Brooklyn, Engineering.
LE VINE, ROBERT A., Long Island City, Anthropology.
LEW, JOHN S., Larchmont, Physics.
LIGHT, JOHN C., Mount Vernon, Chemistry.
LUBELL, ALICE R., Brooklyn, Botany.
LUBIN, JONATHAN D., Staten Island, Mathematics.
LYNCH, EUGENE J. M., Lafayette, Physics.
MAGE, ROSE G., New York, Microbiology.
MARCUS, MICHAEL B., Brooklyn, Mathematics.
MARVIN, DONALD A., Ossining, Biophysics.
MATELES, RICHARD I., New York, Biochemistry.
MCCABE, JOHN P., New York, Mathematics.
MCCARTHY, CHARLES A., Rochester, Mathematics.
MCCLURE, JAMES D., Glen Cove, Chemistry.
MCLEOD, DONALD W., Rochester, Physics.
MENES, JACK, Flushing, Engineering.
MEYER, STUART L., New York, Physics.
MILLER, RICHARD W., Buffalo, Biochemistry.
MINTZ, DONALD E.,[1] Forest Hills, Psychology.
MONSKY, PAUL H., Queens, Mathematics.
MORSE, ROBERT, Brooklyn, Physics.
OLANDER, DONALD R., New York, Engineering.
OLSEN, MARY J., Northport, Genetics.
ONLEY, JUDITH W., Rochester, Psychology.
PALEY, HIRAM, Rochester, Mathematics.
PEARLMAN, ROBERT, Long Beach, Mathematics.
PEEK, LAUREL L. S., Fair Haven, Chemistry.
PERSHAN, PETER S., Brooklyn, Physics.
PESKOFF, ARTHUR, Jamaica, Engineering.
RAPPAPORT, RHODA, New York, History of Science.
RICHTER, ALAN A., Brooklyn, Genetics.
RIND, KENNETH W., Brooklyn, Chemistry.
RODRIGUEZ, DAVID A., New Rochelle, Engineering.
ROSENBERG, DAVID, Brooklyn, Genetics.
ROZIN, PAUL N., Brooklyn, Psychology.
SAGE, MARTIN L.,[1] New York, Chemistry.
SALZMAN, ALICE J., Bronx, Chemistry.
SCHULT, ROY L., Geneva, Physics.
SCHULTZ, JOHN L., Brooklyn, Chemistry.
SCHULTZ, JONAS, Brooklyn, Physics.
SCHUSTER, DAVID I., Cedarhurst, Chemistry.
SEECOF, ROBERT L., New York, Genetics.
SEERY, VIRGINIA L., Elmont, Zoology.

[1] Declined.

SHAPIRO, ROBERT, New York, Chemistry.
SHIMAN, PAUL L., New York, Theory of Games.
SHURE, FRED C., New York, Physics.
SILVER, MARC S., New Rochelle, Chemistry.
SMITH, DAVID Y., Schenectady, Physics.
SMITH, KATHERINE A., Rockville Centre, Psychology.
SPIEGEL, STANLEY L.,[1] New York, Physics.
STAFFORD, FRED E., Bronx, Chemistry.
STARK, GEORGE R., New York, Biochemistry.
STERNHEIM, MORTON M., New York, Physics.
STEWART, DARYL G., Ithaca, Agriculture.
STRAUSS, HERBERT L., Kew Gardens, Chemistry.
STRUMEYER, DAVID H., Brooklyn, Biochemistry.
SWIFT, MICHAEL R., Brooklyn, Mathematics.
TAUSNER, MENASHA J., Bronx, Physics.
TAYLOR, HOWARD S.,[1] Bronx, Chemistry.
THORNDIKE, EDWARD H., Montrose, Physics.
TOBIAS, IRWIN, Brooklyn, Chemistry.
TOOMRE, ALAR,[1] Hempstead, Engineering.
VINCOW, GERSHON, Brooklyn, Chemistry.
VOGL, JOSEPH L., Richmond Hill, Physics.
VOZICK, MICHAEL W., New York, Biochemistry.
WARNER, ROBERT E., Rochester, Physics.
WEBB, JULIAN P., Rochester, Physics.
WEHN, DONALD, Brooklyn, Mathematics.
WHALAND, NORMAN D., Jr., Delmar, Mathematics.
WYTTENBACH, CHARLES R., Elmira, Zoology.
ZWICKEL, ALLAN M., Lynbrook, Chemistry.

Regular Postdoctoral

BAUM, LEONARD E., Brooklyn, Mathematics.
BOL, KEES, Levittown, Physics.
BONVENTRE, PETER, Brooklyn, Microbiology.
DAVIS, HORACE C., Bronxville, Mathematics.
GRAY, JULIET M., Brooklyn, Psychology.
HECHT, CHARLES E., Brooklyn, Chemistry.
HERTZIG, DAVID, Brooklyn, Mathematics.
HERZ, CARL S.,[1] Ithaca, Mathematics.
KOOSIS, PAUL J., Scarsdale, Mathematics.
LANDOVITZ, LEON F., Brooklyn, Physics.
LAUFER, HANS,[1] Ithaca, Zoology.
LUBKIN, ELIHU,[1] Brooklyn, Physics.
MAZUR, PETER, New York, Medical Sciences.
ROCKMORE, RONALD M., Brooklyn, Physics.
RUBEL, LEE A., New York, Mathematics.
SOLA, DONALD F., Trumansburg, Anthropology.
SOMMERFIELD, CHARLES M., Brooklyn, Physics.

Senior Postdoctural

ALLEN, ELSA G., Ithaca, Convergent Field.
BERSOHN, RICHARD, Cornell University, Chemistry.
KORF, RICHARD P., Trumansburg, Botany.

Science Faculty

DICKSON, DOUGLAS G., New York, Mathematics.
EVANS, HOWARD E., Ithaca, Zoology.
GOULD, EDWIN S., Astoria, Chemistry.
GUGIG, WILLIAM, Brooklyn, Chemistry.
KINGSBURY, JOHN M., Ithaca, General Biology.
MACDOWELL, ROBERT W., Rochester, Mathematics.
NISTERUK, CHESTER J., Brooklyn, Physics.
PETERS, RUTH M., Canton, Mathematics.
TAYLOR, FRANCIS B., Bronx, Mathematics.
VAN ALSTYNE, JOHN P., Clinton, Mathematics.

NORTH CAROLINA

Predoctoral

ALEXANDER, SHELTON S., Statesville, Earth Sciences.
DEARMAN, HENRY H., Statesville, Chemistry.
FLACCUS, EDWARD, Durham, Botany.

[1] Declined.

HORNER, SALLY M., Chapel Hill, Chemistry.
MANSFIELD-JONES, DOROTHY, Durham, Botany.
MCGEIVER, SAMUEL F.,[1] Asheboro, Engineering.
MEWBORN, ANGEL C., Chapel Hill, Mathematics.
MULDROW, CHARLES N., Jr., Hendersonville, Chemistry.
POSTMA, HERMAN, Wilmington, Physics.
SNIPES, CHARLES A., Sylva, Zoology.
SNIPES, RAYMOND F., Reidsville, Chemistry.
YOW, FRANCIS W., Asheville, Zoology.

Regular Postdoctoral

STINESPRING, W. FORREST, Durham, Mathematics.

Senior Postdoctoral

JONES, F. BURTON, Chapel Hill, Mathematics.

Science Faculty

GALLENT, JOHN B., Davidson, Chemistry.
MEDLIN, GENE W., Greensboro, Mathematics.

NORTH DAKOTA

Predoctoral

PARKER, DAVID J., Fargo, Chemistry.
VINJE, JOHN C., Gardner, Earth Sciences.

OHIO

Predoctoral

BOOTS, DAVID A., Akron, Earth Sciences.
BROWN, THOMAS A. Wright-Patterson AFB, Mathematics.
BURFORD, ARTHUR E., North Olmsted, Earth Sciences.
BUTLER, JAMES N., Lakewood, Chemistry.
CALAHAN, DONALD A., Cincinnati, Engineering.
CARNAHAN, BRICE, New Philadelphia, Engineering.
CARRUTHERS, PETER A., Middletown, Physics.
CLARK, ALLAN H., Silverton, Mathematics.
CLARK, THOMAS, J., St. Marys, Chemistry.
EK, FREDERICK L., Cuyahoga Falls, Physics.
ELDER, CAROL-ANN, Cleveland Heights, Botany.
FARRAND, WILLIAM R., Columbus, Earth Sciences.
FEIL, JOSEPH N., Cuyahoga Falls, Engineering.
HELLING, MARTIN, Canton, Mathematics.
HELMS, CARL W., Bowling Green, Zoology.
HUFF, ROBERT W., Canton, Physics.
KRAPP, PAUL J., Springfield, Chemistry.
LENHERT, P. GALEN, Arcanum, Biophysics.
LOWENSTEIN, CARL D., Kent, Physics.
MALONEY, WILLIAM T., Jr., Niles, Engineering.
MARSHALL, THOMAS C., Cleveland, Physics.
MCKISSICK, ROBERT J., Coshocton, Mathematics.
MILLER, ROGER H., Dayton, Physics.
OGG, ANDREW P., Bowling Green, Mathematics.
REED, NANCY L., Columbus, Biochemistry.
RESHOTKO, ELI,[1] Cleveland, Engineering.
ROSEN, RONALD H., Cleveland Heights, Mathematics.
SIMPSON, ANNA L., Oberlin, Psychology.
SLAGGIE, E. LEO, Dayton, Physics.
VENETTA, BENJAMIN D., Cleveland, Zoology.
VON DER EMBSE, URBAN A., Kalida, Engineering.
YOUNG, ANDREW T., Massillon, Astronomy.

Regular Postdoctoral

AUSTIN, DONALD G., Columbus, Mathematics.
BAUGHMAN, D. JOE, Cleveland, Biophysics.
RAUSCH, MARVIN D., Dayton, Chemistry.
TOBIAS, RUSSELL S.,[1] Columbus, Chemistry.

Senior Postdoctoral

POTTER, PAUL E., Cincinnati, Mathematics.
RUDNEY, HARRY, Cleveland, Biochemistry.

[1] Declined.

Science Faculty

BOHNING, RICHARD H., Columbus, Botany.
CURRY, THOMAS H., Athens, Physical Sciences.
HOLYOKE, THOMAS C., Oxford, Physics.
LABORDE, HASELL T., Cincinnati, Mathematics.
PENDROTTI, LENO S., New Carlisle, Physics.
STEINER, LUKE E., Oberlin, Chemistry.

OKLAHOMA

Predoctoral

BOYER, DON R., Oklahoma City, Zoology.
CROWLEY, JOHN M., Tulsa, Agriculture.
DABNEY, JOE M., Oklahoma City, Medical Sciences.
DENISON, GILBERT W., Norman, Engineering.
FRETWELL, LYMAN J., Jr., Tulsa, Physics.
HEDGES, FRANK, Stillwater, Engineering.
KRUGER, ROBERT A., Oklahoma City, Engineering.
LOVEJOY, CAROLYN A., Oklahoma City, Chemistry.

OREGON

Predoctoral

BALL, JAMES B., Estacada, Chemistry.
COLE, GLEN H., Portland, Anthropology.
DE BAR, ROGER B., EUGENE, Physics.
DRUMMOND, WILLIAM E., Portland, Physics.
KIND, PHYLLIS D., Portland, Microbiology.
KUEHL, LE ROY R., Corvallis, Biochemistry.
NEWTON, RICHARD M., Corvallis, Biochemistry.
OHLSEN, GERALD G., Eugene, Physics.
RITCHIE, ROBERT W., Portland, Mathematics.

Senior Postdoctoral

KING, TSOO E., Corvallis, Biochemistry.

Science Faculty

LARSON, MILTON B., Corvallis, Engineering.
TRIGG, GEORGE L., Corvallis, Physics.

[1] Declined.

PENNSYLVANIA

Predoctoral

AARON, RONALD, Philadelphia, Physics.
ASKEY, RICHARD A., Allentown, Mathematics.
BERTRAM, WALTER J., Jr., Pittsburgh, Physics.
BODOIA, JOHN R., Monessen, Engineering.
BOHACHEVSKY, IHOR O., Philadelphia, Mathematics.
BRICE, MARTHA C., Glenside, Zoology.
BURGIN, WALTER H., Jr., Camp Hill, Mathematics.
CARPENTER, JOHN M.,[1] Williamsport, Engineering.
CAVANAUGH, JAMES R., Wyndmoor, Chemistry.
COX, DAVID J., Swarthmore, Biochemistry.
COX, WALTER M., Glenside, Earth Sciences.
DAVIES, K. THOMAS R., Pittsburgh, Physics.
EARLE, CLIFFORD J., Jr., Philadelphia, Mathmatics.
EVANS, DAVID W., Erie, Agriculture.
FRENCH, THAYER C., Sewickley, Biochemistry.
GAGNON, RALPH J., Kingsley, Engineering.
GLADFELTER, WILBERT E., Ridley Park, Medical Sciences.
GLARUM, SIVERT H.,[1] Wyncote, Chemistry.
GOLLUB, LEWIS R., Philadelphia, Psychology.
GOUTERMAN, MARTIN P., Philadelphia, Physics.
GROOM, DONALD E., Turtle Creek, Physics.
HALL, ROBERT D., Philadelphia, Psychology.
HATCH, THEODORE F., Jr., Pittsburgh, Engineering.
HILL, E. ALEXANDER, III, Carnegie, Chemistry.
HIRSCHFIELD, JUDITH B., Pittsburgh, Mathematics.
HOHMANN, JERE W., Volant, Engineering.
JOHNS, LEWIS E., Jr., Pittsburgh, Engineering.
JONES, EVAN T., Rosemont, Chemistry.

JONES, RICHARD H., Ridley Park, Engineering.
KARLIN, ARTHUR,[1] Philadelphia, Biophysics.
KAUFFMAN, MARVIN E., Lancaster, Earth Sciences.
KRAMER, JOHN D. R., Jr., Philadelphia, Engineering.
LANGER, JAMES S., Pittsburgh, Physics.
LOVE, WILLIAM A., Pittsburgh, Physics.
MARTIN, E. DALE, Lancaster, Engineering.
MCNUTT, DOUGLAS P., Philadelphia, Physics.
MCWILLIAMS, IAN G., Philadelphia, Physics.
MELNGAILIS, IVARS,[1] Pittsburgh, Engineering.
MILEY, GEORGE H., II, Petrolia, Engineering.
MORRISON, JAMES L., Pittsburgh, Physics.
MULLHAUPT, J. TIMOTHY, Warren, Chemistry.
MUNSON, RONALD A., Lancaster, Chemistry.
OLENICZAK, ALBERT T.,[1] Philadelphia, Engineering.
ORTTUNG, WILLIAM H.,[1] Narberth, Chemistry.
PENDLETON, HUGH N., III, Pittsburgh, Physics.
ROBINSON, BRUCE B., Brookhaven, Physics.
ROCKMORE, DAVID M.,[1] Cambridge Springs, Physics.
ROTHBERG, JOSEPH E., Philadelphia, Physics.
SARTORY, WALTER K., Pittsburg, Engineering.
SCHMOYER, LAURENCE F., Allentown, Engineering.
SHAPIRO, GILBERT, Philadelphia, Physics.
SHAW, LEONARD G., Philadelphia, Engineering.
SHEPPARD, RICHARD A., Lancaster, Earth Sciences.
SHER, LAWRENCE D., Merion, Physics.
SIMMONS, VIOLET E., Philadelphia, Chemistry.
SMITH, GEORGE E., Upper Darby, Physics.
SMITH, GERALD J., Jr., Newtown Square, Mathematics.
SMOLINSKY, GERALD, Philadelphia, Chemistry.
SNYDER, EUGENE I., Philadelphia, Chemistry.
SNYDER, LAWRENCE C., Pittsburgh, Chemistry.
STEIN, FRED P., Dallastown, Engineering.
THORNTON, H. FRANCIS, Philadelphia, Mathematics.
VAISNYS, JUOZAS R., Philadelphia, Chemistry.
VAN VALEN, LEIGH, Harrisburg, Zoology.
WINDGASSEN, RICHARD J., Jr., Allison Park, Chemistry.
WOODS, ROBERT M., Jr., New Wilmington, Physics.

Regular Postdoctoral

COHEN, LEONARD A., Pittsburgh, Medical Sciences.
DUBINS, LESTER E., Pittsburgh, Mathematics.
FRYSINGER, GALEN R., Lancaster, Chemistry.
STEELE, WILLIAM A., State College, Chemistry.

Senior Postdoctoral

KOHMAN, TRUMAN P., Pittsburgh, Chemistry.
KOHN, WALTER, Chatham, Physics.

Science Faculty

GROVE, DAVISON G., Chambersburg, General Biology.
HEATH, DOUGLAS H., Rosemont, Psychology.
RICHARDSON, ARCHIE M., Jr., Tarentum, Engineering.
RUMPF, JOHN L., Bethayres, Engineering.

RHODE ISLAND

Predoctoral

BEAUDET, ROBERT A., Woonsocket, Chemistry.
BURTON, PAUL E., Warwick, Chemistry.
CAMPBELL, DONALD R., Providence, Chemistry.
EINSTEIN, JULIAN R., Providence, Medical Sciences.
FLYNN, GEORGE P., Jr., Warren, Chemistry.

[1] Declined.

SZYMANSKI, JOSEPH J., Providence, Physics.

Regular Postdoctoral

MURPHY, EDWARD L., Cranston, Physics.

SOUTH CAROLINA

Predoctoral

DEGGES, THOMAS C., Heath Springs, Physics.
HAMILTON, CHARLES R., Greenville, Biophysics.
KING, HAROLYN, St. George, Chemistry.

Science Faculty

WOOD, BURRELL L., Jr., Greenville, Biochemistry.

SOUTH DAKOTA

Predoctoral

MINEHART, RALPH C., Mitchell, Physics.

Regular Postdoctoral

BILLINGSLEY, PATRICK P., Sioux Falls, Mathematics.

Science Faculty

BEDWELL, THOMAS H., Springfield, Physics.

TENNESSEE

Predoctoral

BLAIR, JAMES C., Bristol, Engineering.
BLANKENBECLER, RICHARD, Kingsport, Physics.
CHADWELL, ANDREW J., Jr., Knoxville, Chemistry.
COOK, CLARENCE E., Jefferson City, Chemistry.
GRAHAM, WILLIAM H., Jackson, Chemistry.
WALLACE, WILLIAM J., Clinton, Chemistry.

Regular Postdoctoral

DURAND, LOYAL, III, Knoxville, Physics.

Science Faculty

KEENAN, CHARLES W., Knoxville, Convergent Field.
MYLES, MARION R., Nashville, Botany.
RAWLS, JOHN M., Clarksville, Zoology.
STEVENSON, RICHARD, Johnson City, Genetics.

TEXAS

Predoctoral

ABBOTT, WALTER P., Bryan, Zoology.
ARONS, HOWARD L., Dallas, Chemistry.
ASHBY, NEIL, Dalhart, Physics.
BARNES, VIRGIL E., II,[1] Austin, Physics.
BRANS, CARL H., Dallas, Physics.
CLAYTON, DONALD D., Dallas, Physics.
COLE, HENRY D. F., Brownwood, Chemistry.
COLGATE, SAM O., Amarillo, Chemistry.
DAVISON, VEE E., San Antonio, Zoology.
KOTZEBUE, KENNETH L.,[1] San Antonio, Engineering.
MANUEL, THOMAS A.,[1] Austin, Chemistry.
MONGER, JOANNE, Beaumont, Mathematics.
PECK, CHARLES W., Freer, Physics.
PONDROM, LEE G., Dallas, Physics.
ROBERTS, LARRY S., Dallas, Zoology.
STUBBLEFIELD, TRAVIS E., Denton, Medical Sciences.

Regular Postdoctoral

AGOSTA, WILLIAM C.,[1] Dallas, Chemistry.
COLE, ARTHUR,[1] Houston, Biophysics.

Science Faculty

ANDERSON, MILES E., Denton, Physics.
BISER, ROY H., Jr., Beaumont, Physics.
BRADLEY, LILLIAN K., Tyler, Mathematics.
LAMOTTE, CHARLES, College Station, Botany.
TULLOCH, LYNN H., San Marcos, Mathematics.

UTAH

Predoctoral

CHRISTIANSEN, JERALD N., Logan, Engineering.
PINCOCK, RICHARD E., Ogden, Chemistry.
SAGERS, RICHARD D., Tooele, Microbiology.
SHAW, ALAN W., Brigham City, Engineering.

[1] Declined.

VERMONT

Regular Postdoctoral

MACARTHUR, ROBERT H., Newfane, Zoology.

Science Faculty

SMITH, HOWARD M., Jr., Colchester, Engineering.

VIRGINIA

Predoctoral

BLAND, SAMUEL R., Warwick, Physics.
BOBERG, THOMAS C., Falls Church, Engineering.
BURKHARDT, SAMUEL F.,[1] Falls Church, Engineering.
COLEMAN, SAMUEL H., Roanoke, Mathematics.
EANES, EDWARD D., Williamsburg, Chemistry.
FIELD, PETER B., Falls Church, Psychology.
GEORGE, MELVIN D., Arlington, Mathematics.
HANSON, CHARLES L., Alexandria, Zoology.
LIGHT, ROBLEY, J.,[1] Roanoke, Chemistry.
PARDUE, MARY L., Blacksburg, Genetics.
PENNISTON, JOHN T., Fairfax, Chemistry.
PORTERFIELD, WILLIAM W., Richmond, Chemistry.
WAMPLER, JESSE M., Bridgewater, Earth Sciences.
WEYHMANN, WALTER V., Roanoke, Physics.
ZUCHELLI, A. JOSEPH, Jr., Charlottesville, Physics.

Senior Postdoctoral

STEVENSON, EDWARD C., Charlottesville, Physics.

Science Faculty

GROSS, PAUL M., Jr., Charlottesville, Chemistry.

WASHINGTON

Predoctoral

ANDERSON, STUART L., Seattle, Mathematics.
ANEX, BASIL G., Seattle, Chemistry.
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.
FLUHARTY, ARVAN L., Seattle, Biochemistry.
GOSE, EARL E., Aberdeen, Engineering.
HARMON, KENNETH M., Seattle, Chemistry.
LINSTROM, CAROL J., Tacoma, Microbiology.
MERCHANT, HOWARD C., Bothell, Engineering.
METZ, PETER R., Seattle, Engineering.
MINTON, ROBERT G., Seattle, Chemistry.
MOTTELER, ZANE C., Olympia, Mathematics.
MYHRE, PHILIP C., Seattle, Chemistry.
PHELPS, ROBERT R., Seattle, Mathematics.
RUPLEY, JOHN A., Seattle, Biochemistry.
SAGLE, ARTHUR A., Seattle, Mathematics.
SEEDS, ROBERT B., Vancouver, Engineering.
STRANG, WILLIAM G., Seattle, Mathematics.

Regular Postdoctoral

BUSTAD, LEO K., Richland, Medical Sciences.
MCCOY, LAYTON, L., Seattle, Chemistry.
WALTER, JOHN H., Seattle, Mathematics.

Senior Postdoctoral

HALPERN, ISAAC, Seattle, Physics.

Science Faculty

ANDERSON, NORMAN R., Tacoma, Earth Sciences.
MARIANI, TONI N., Spokane, Medical Sciences.

WEST VIRGINIA

Predoctoral

BAULD, NATHAN L., Clarksburg, Chemistry.
HIGHLAND, VIRGIL L.,[1] Clarksburg, Physics.
PIERSON, WILLIAM R., Charleston, Chemistry.

[1] Declined.

Wisconsin

Predoctoral

Bowman, Robert E., Madison, Psychology.
Brown, Richard I., Milwaukee, Physics.
Bushnell, William R., Madison, Botany.
Cummisford, Patricia D., Milwaukee, Medical Sciences.
Fallgatter, Michael B., Waupaca, Chemistry.
Frautschi, Steven C., Madison, Physics.
Goodrich, Kenneth P., Milwaukee, Psychology.
Groves, Steven H., Madison, Physics.
Haberstroh, Robert A., Wauwatosa, Physics.
Hensel, Gustav B., Sheboygan, Mathematics.
Jacob, Richard L., Ripon, Physics.
Kingsley, Jack D., Madison, Physics.
Laudon, Richard B., Waunakee, Earth Sciences.
Marden, Albert, Milwaukee, Mathematics.
Meyer, Richard T., Madison, Chemistry.
Pfefferkorn, Elmer R., Manitowoc, Medical Sciences.
Pomraning, Gerald C.,[1] Oshkosh, Engineering.
Reibel, Samuel F.,[2] Madison, Microbiology.
Roesler, Fred L., Wauwatosa, Physics.
Sharp, Terry E., La Crosse, Chemistry.
Steigelmann, Edward F., Milwaukee, Chemistry.
Walecka, John D.,[1] Wauwatosa, Physics.
Ziegler, Judith A., Eau Claire, Psychology.

Regular Postdoctoral

Bates, Robert B.,[1] Madison, Chemistry.
Greenkorn, Robert A., Madison, Engineering.
Hoekstra, William G.,[1] Madison, Biochemistry.
Morter, Raymond L., Lodi, Medical Sciences.

Senior Postdoctoral

Hagedorn, Donald J., Madison, Botany.
Hirschfelder, Joseph O., Middleton, Chemistry.
McShan, William H., Madison, Biochemistry.

Science Faculty

Jaggard, Robert A., Milwaukee, Physics.
Rowe, Chandler W., Appleton, Anthropology.
Wahlstrom, Lawrence F., Eau Claire, Mathematics.

Wyoming

Predoctoral

Buckingham, William J., Jackson, Mathematics.
Deffeyes, Kenneth S., Casper, Earth Sciences.
Kleindienst, Maxine R., Superior, Anthropology.
Talbert, Willard L., Jr., Casper, Physics.

Alaska

Predoctoral

Christensen, Mark N., College, Earth Sciences.

Science Faculty

Hoskins, John R., College, Engineering.
Sargent, Charles, College, Engineering.

Hawaii

Predoctoral

Murashige, Toshio, Hilo, Botany.

Science Faculty

Digman, John M., Honolulu, Psychology.

Puerto Rico

Predoctoral

Levins, Richard, Yacuco, Genetics.

[1] Declined.
[2] Deceased.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students

Institution and location	Number of fellows: Attended as undergraduates	Number of fellows: Attended as graduate students [1]
Adelbert College, Cleveland, Ohio	2	.....
Albion College, Albion, Mich	2	.....
Allegheny College, Meadville, Pa	1	.....
Amarillo College, Amarillo, Tex	1	.....
Amherst College, Amherst, Mass	1	1
Antioch College, Yellow Springs, Ohio	2	.....
Arlington State College, Arlington, Tex	1	.....
Asheville-Biltmore College, Asheville, N. C	1	.....
Assumption College, Worcester, Mass	1	.....
Atlantic Union College, South Lancaster, Mass	1	.....
Balliol College, Oxford, England	1	.....
Barnard College, New York, N. Y	4	.....
Bethel College, North Newton, Kans	1	.....
Boston College, Chestnut Hill, Mass	1	.....
Boston University, Boston, Mass	.....	2
Bowling Green State University, Bowling Green, Ohio	2	1
Bradford Durfee Technical Institute, Fall River, Mass	1	.....
Brandeis University, Waltham, Mass	2	[2] 2
Bridgewater College, Bridgewater, Va	1	.....
Brigham Young University, Provo, Utah	3	3
Brooklyn College, Brooklyn, N. Y	7	1
Brooklyn Polytechnic Institute, Brooklyn, N. Y	7	3
Brown University, Providence, R. I	4	10
Bryn Mawr College, Bryn Mawr, Pa	1	.....
Butler University, Indianapolis, Ind	1	.....
California Institute of Technology, Pasadena, Calif	23	49
Calvin College, Grand Rapids, Mich	1	.....
Carleton College, Northfield, Minn	5	.....
Carnegie Institute of Technology, Pittsburgh, Pa	21	12
Carson-Newman College, Jefferson City, Tenn	2	.....
Case Institute of Technology, Cleveland, Ohio	5	2
Catholic University of America, Washington, D. C	1	1
Cedar Crest College, Allentown, Pa	1	.....
Central Washington College of Education, Ellenburg, Wash	1	.....
Chaffey College, Ontario, Calif	1	.....
Chicago Teachers College, Chicago, Ill	.....	1
Christian Brothers College, Memphis, Tenn	1	.....
City College of New York, New York, N. Y	9	.....
Claremont Graduate School, Claremont, Calif	.....	3
College of Charleston, Charleston, S. C	1	.....
College of Puget Sound, Tacoma, Wash	1	.....
College of St. Catherine, St. Paul, Minn	1	.....

[1] This column includes number of fellows who have attended the university listed as graduate students prior to the academic year 1957–58 or plan to attend the listed university as NSF fellows during 1957–58.

[2] Summer session only.

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Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	*Number of fellows*	
	Attended as undergraduates	*Attended as graduate students* [1]
College of St. Thomas, St. Paul, Minn	2	.....
College of William & Mary, Williamsburg, Va	3	.....
College of Wooster, Wooster, Ohio	2	.....
Colorado College, Colorado Springs, Colo	2	.....
Colorado School of Mines, Golden, Colo	3	1
Colorado State University, Fort Collins, Colo	1	1
Columbia University, New York, N. Y	21	35
Concordia College, Moorhead, Minn	1	.....
Cooper Union, New York, N. Y	1	.....
Cornell University, Ithaca, N. Y	28	29
Dartmouth College, Hanover, N. H	5	.....
Denison University, Granville, Ohio	1	.....
De Paul University, Chicago, Ill	1	2
De Pauw University, Greencastle, Ind	4	.....
Drexel Institute of Technology, Philadelphia, Pa	6	.....
Duke University, Durham, N. C	2	9
Earlham College, Richmond, Ind	1	.....
Eastman School of Music, Rochester, N. Y	1	.....
El Camino College, El Camino College, Calif	1	.....
Emory University, Emory University, Ga	1	3
Everett Junior College, Everett, Wash	1	.....
Exeter College, Oxford, England	.....	1
Florida State University, Tallahassee, Fla	1	4
Fordham University, New York, N. Y	1	.....
Franklin & Marshall College, Lancaster, Pa	4	.....
George August University, Gottingen, Germany	.....	1
Georgetown University, Washington, D. C	1	.....
George Washington University, Washington, D. C	2	2
Georgia Institute of Technology, Atlanta, Ga	1	.....
Gettysburg College, Gettysburg, Pa	1	.....
Goshen College, Goshen, Ind	1	.....
Goucher College, Baltimore, Md	1	.....
Graceland College, Lamoni, Iowa	1	.....
Grand Rapids Junior College, Grand Rapids, Mich	1	.....
Grays Harbor College, Aberdeen, Wash	1	.....
Grinnell College, Grinnell, Iowa	1	.....
Gustavus Adolphus College, St. Peter, Minn	1	.....
Hamline University, St. Paul, Minn	1	.....
Harding College, Searcy, Ark	1	.....
Harvard University, Cambridge, Mass	29	113
Haverford College, Haverford, Pa	3	.....
Herzl Junior College, Chicago, Ill	1	.....
Howard College, Birmingham, Ala	1	.....
Hunter College, New York, N. Y	.....	2
Illinois Institute of Technology, Chicago, Ill	5	1
Immaculate Heart College, Los Angeles, Calif	1	.....

[1] See footnote page 201.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	Number of fellows: Attended as undergraduates	Number of fellows: Attended as graduate students [1]
Indiana University, Bloomington, Ind	6	5
Iowa State College, Ames, Iowa	10	6
Jacksonville Junior College, Jacksonville, Fla	1	.....
James Millikin University, Decatur, Ill	1	.....
Jersey City Junior College, Jersey City, N. J	1	.....
Johns Hopkins University, Baltimore, Md	4	14
Joliet Junior College, Joliet, Ill	1	.....
Julliard School of Music, New York, N. Y	1	.....
Kalamazoo College, Kalamazoo, Mich	1	.....
Kansas City Junior College, Kansas City, Mo	1	.....
Kansas State College, Manhattan, Kans	3	1
Kansas State Teachers College, Emporia, Kans	1	.....
Kent State University, Kent, Ohio	1	.....
Kentucky Wesleyan College, Winchester, Ky	1	.....
Kenyon College, Gambier, Ohio	1	.....
Keystone Junior College, La Plume, Pa	1	.....
King College, Bristol, Tenn	1	.....
King's College, London, England	.....	1
Knox College, Galesburg, Ill	.....	1
Lafayette College, Easton, Pa	1	.....
Lamar State College of Technology, Beaumont, Tex	1	.....
Lawrence College, Appleton, Wis	2	.....
Lehigh University, Bethlehem, Pa	7	.....
Long Island Biological Laboratory, Cold Springs Harbor, N. Y	.....	[2] 1
Los Angeles City College, Los Angeles, Calif	1	.....
Los Angeles State College, Los Angeles, Calif	1	.....
Louisiana State University, Baton Rouge, La	2	2
Loyola University, Chicago, Ill	2	2
Loyola University, New Orleans, La	2	.....
Luther College, Decorah, Iowa	1	.....
Lyons Township Junior College, La Grange, Ill	1	.....
Manchester College, North Manchester, Ind	1	.....
Manhattan College, New York, N. Y	3	.....
Marine Biological Laboratory, Woods Hole, Mass	.....	[2] 2
Mason City Junior College, Mason City, Iowa	1	.....
Massachusetts Institute of Technology, Cambridge, Mass	36	66
Meredith College, Raleigh, N. C	1	.....
Messiah College, Grantham, Pa	1	.....
Miami University, Oxford, Ohio	2	.....
Michigan College of Mining & Technology, Houghton, Mich	1	.....
Michigan State University, East Lansing, Mich	2	4
Middlebury College, Middlebury, Vt	[2] 1	.....
Mississippi Southern College, Hattiesburg, Miss	1	.....
Mississippi State College, State College, Miss	1	.....
Missouri School of Mines, Rolla, Mo	1	.....

[1] See footnote page 201.

[2] Summer session only.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	Number of fellows: Attended as undergraduates	Number of fellows: Attended as graduate students [1]
Montana State University, Missoula, Mont	3	1
Mount Holyoke College, South Hadley, Mass	3	.....
Mount St. Mary's College, Emmitsburg, Md	1	.....
Mundelein College, Chicago, Ill	1	.....
Municipal University of Wichita, Wichita, Kans	2	1
Nebraska Wesleyan University, Lincoln, Nebr	1	.....
Newark College of Engineering, Newark, N. J	1	.....
New Jersey State Teachers College, Upper Montclair, N. J	1	.....
New Mexico College of Agriculture and Mechanic Arts, State College, N. Mex	3	.....
New York University, New York, N. Y	7	4
North Carolina State College of Agriculture and Engineering, Raleigh, N. C	.....	3
North Dakota Agricultural College, State College, N. Dak	1	.....
North Dakota State School of Science, Wahpeton, N. Dak	1	.....
Northeastern University, Boston, Mass	1	.....
North Texas State College, Denton, Tex	1	.....
Northwestern University, Evanston, Ill	9	9
Oberlin College, Oberlin, Ohio	12	.....
Occidental College, Los Angeles, Calif	1	.....
Ohio State University, Columbus, Ohio	6	7
Ohio University, Athens, Ohio	1	.....
Ohio Wesleyan University, Delaware, Ohio	1	.....
Oklahoma State University, Stillwater, Okla	4	3
Oregon State University, Corvallis, Oreg	2	3
Ouachita College, Arkadelphia, Ark	1	.....
Pacific Lutheran College, Angwin, Calif	1	.....
Palomar College, Vista, Calif	[2] 1	.....
Park College, Parkville, Mo	1	.....
Parsons College, Fairfield, Iowa	1	.....
Pasadena City College, Pasadena, Calif	1	.....
Pennsylvania State University, University Park, Pa	4	5
Pomona College, Claremont, Calif	10	.....
Pratt Institute, Brooklyn, N. Y	1	.....
Princeton University, Princeton, N. J	21	37
Providence College, Providence, R. I	2	.....
Purdue University, Lafayette, Ind	6	5
Queens College, Flushing, N. Y	3	.....
Radcliffe College, Cambridge, Mass	2	8
Randolph-Macon College, Ashland, Va	1	.....
Reed College, Portland, Oreg	5	.....
Regis College, Denver, Colo	1	.....
Rensselaer Polytechnic Institute, Troy, N. Y	9	3
Rice Institute, Houston, Tex	1	1
Rollins College, Winter Park, Fla	1	.....

[1] See footnote page 201.

[2] Summer session only.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	*Number of fellows*	
	Attended as undergraduates	*Attended as graduate students* [1]
Roosevelt College, Chicago, Ill	1	[2] 1
Rutgers University, New Brunswick, N. J	4	3
Saint John's College, Annapolis, Md	1	.....
Saint John's University, Brooklyn, N. Y	2	1
Saint Joseph's College, Philadelphia, Pa	2	.....
Saint Lawrence University, Canton, N. Y	1	.....
Saint Louis University, St. Louis, Mo	1	.....
Saint Norbert College, West De Pere, Wis	1	.....
Saint Olaf College, Northfield, Minn	3	.....
Sampson College, Sampson, N. Y	1	.....
San Bernardino Valley College, San Bernardino, Calif	1	.....
San Jose State College, San Jose, Calif	2	.....
Scripps College, Claremont, Calif	1	.....
Seattle University, Seattle, Wash	1	.....
Seton Hill College, Greensburg, Pa	1	.....
Shimer College, Mt. Carroll, Ill	2	.....
Smith College, Northampton, Mass	1	1
Southern Illinois University, Carbondale Ill	2	.....
Southern Methodist University, Dallas, Tex	5	.....
Spring Hill College, Spring Hill, Ala	3	.....
Stanford University, Stanford, Calif	11	34
State College of Washington, Pullman, Wash	1	1
State Teachers College, Eau Claire, Wis	1	.....
State Teachers College, La Crosse, Wis	1	.....
State University of Iowa, Iowa City, Iowa	2	3
Sterling College, Sterling, Kans	1	.....
Stevens Institute of Technology, Hoboken, N. J	.....	1
Stockton College, Stockton, Calif	1	.....
Swarthmore College, Swarthmore, Pa	8	.....
Syracuse University, Syracuse, N. Y	2	.....
Technical Institute, Munich, Germany	.....	1
Technische Hochschule, Karlsruhe, Germany	.....	2
Temple University, Philadelphia, Pa	3	.....
Texas A. & M. College, College Station, Tex	[2] 1	1
Texas College of Arts and Industries, Kingsville, Tex	1	.....
Thayer School of Engineering, Hanover, N. H	.....	1
Trinity University, San Antonio, Tex	1	1
Tufts University, Medford, Mass	2	1
Tulane University, New Orleans, La	1	2
Union College, Schenectady, N. Y	1	.....
Union Junior College, Cranford, N. J	1	.....
University of Alabama, University, Ala	1	.....
University of Alaska, College, Alaska	1	.....
University of Arizona, Tucson, Ariz	2	4
University of Arkansas, Fayetteville, Ark	6	1

[1] See footnote page 201.

[2] Summer session only.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	Number of fellows: Attended as undergraduates	Number of fellows: Attended as graduate students[1]
University of Birmingham, Birmingham, England	.....	2
University of Bristol, Bristol, England	1	.....
University of Brussels, Brussels, Belgium	.....	1
University of Buffalo, Buffalo, N. Y	1	.....
University of California, Berkeley, Calif	23	56
University of California, Los Angeles, Calif	6	15
University of California, Riverside, Calif	1	.....
University of Cambridge, Cambridge, England	1	4
University of Chicago, Chicago, Ill	32	52
University of Cincinnati, Cincinnati, Ohio	[2] 1	.....
University of Colorado, Boulder, Colo	13	5
University of Connecticut, Storrs, Conn	2	2
University of Delaware, Newark, Del	2	6
University of Denver, Denver, Colo	1	.....
University of Detroit, Detroit, Mich	3	1
University of Florida, Gainesville, Fla	6	3
University of Freiburg, Freiburg, Germany	.....	[2] 1
University of Georgia, Athens, Ga	1	1
University of Gottingen, Gottingen, Germany	.....	1
University of Hamburg, Hamburg, Germany	.....	1
University of Hawaii, Honolulu, Hawaii	1	.....
University of Heidelberg, Heidelberg, Germany	.....	2
University of Idaho, Moscow, Idaho	1	.....
University of Illinois, Urbana, Ill	22	31
University of Kansas, Lawrence, Kans	3	5
University of Kentucky, Lexington, Ky	3	3
University of Leiden, Leiden, Netherlands	.....	1
University of Maine, Orono, Maine	1	.....
University of Manchester, Manchester, England	.....	1
University of Maryland, College Park, Md	2	2
University of Massachusetts, Amherst, Mass	3	2
University of Miami, Coral Gables, Fla	1	.....
University of Michigan, Ann Arbor, Mich	12	33
University of Minnesota, Minneapolis, Minn	8	14
University of Missouri, Columbia, Mo	5	1
University of Nebraska, Lincoln, Nebr	8	6
University of New Hampshire, Durham, N. H	1	2
University of New Mexico, Albuquerque, N. Mex	6	3
University of North Carolina, Chapel Hill, N. C	6	4
University of Notre Dame, Notre Dame, Ind	6	4
University of Oklahoma, Norman, Okla	6	4
University of Omaha, Omaha, Nebr	1	.....
University of Oregon, Eugene, Oreg	2	.....
University of Oxford, Oxford, England	2	1
University of Paris, Paris, France	.....	3
University of Pennsylvania, Philadelphia, Pa	9	10

[1] See footnote page 201.

[2] Summer session only.

Institutions Attended by 1957–58 NSF Predoctoral Fellows as Undergraduates and Graduate Students—Continued

Institution and location	*Number of fellows*	
	Attended as undergraduates	*Attended as graduate students*[1]
University of Rochester, Rochester, N. Y	11	6
University of Santa Clara, Santa Clara, Calif	1	.....
University of the South, Sewanee, Tenn	1	.....
University of Southern California, Los Angeles, Calif	4	4
University of Stockholm, Stockholm, Sweden	.....	1
University of Tennessee, Knoxville, Tenn	1	3
University of Texas, Austin, Tex	4	5
University of Tulsa, Tulsa, Okla	1	1
University of Utah, Salt Lake City, Utah	2	.....
University of Utrecht, Utrecht, Netherlands	.....	2
University of Vermont, Burlington, Vt	1	.....
University of Virginia, Charlottesville, Va	5	4
University of Washington, Seattle, Wash	9	15
University of Wisconsin, Madison, Wis	12	42
University of Wyoming, Laramie, Wyo	1	[2] 1
Utah State Agricultural College, Logan, Utah	3	1
Vanderbilt University, Nashville, Tenn	1	2
Villanova College, Villanova, Pa	1	.....
Virginia Polytechnic Institute, Blacksburg, Va	2	1
Wabash College, Crawfordsville, Ind	1	.....
Wake Forest College, Wake Forest, N. C	1	.....
Walla Walla Biological Station, Anacortes, Wash	.....	[2] 1
Washburn University, Topeka, Kans	1	.....
Washington & Jefferson College, Washington, Pa	1	.....
Washington University, St. Louis, Mo	3	6
Wayne University, Detroit, Mich	.....	1
Wellesley College, Wellesley, Mass	1	.....
Wells College, Aurora, N. Y	1	.....
Wesleyan University, Middleton, Conn	5	.....
Western Carolina Teachers College, Cullowhee, N. C	2	.....
Western Illinois State College, Macomb, Ill	[2] 1	.....
Western Michigan College of Education, Kalamazoo, Mich	1	.....
Western Reserve University, Cleveland, Ohio	[2] 1	1
West Texas State College, Canyon, Tex	1	.....
West Virginia University, Morgantown, W. Va	1	.....
Wheaton College, Wheaton, Ill	2	.....
Whitman College, Walla Walla, Wash	1	.....
Wilkes College, Wilkes-Barre, Pa	1	.....
Wilson Junior College, Chicago, Ill	1	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	3	.....
Yale University, New Haven, Conn	22	29
Yeshiva University, New York, N. Y	1	1

[1] See footnote page 201.

[2] Summer session only.

Present or Most Recent Institutional Affiliation of Individuals Awarded National Science Foundation Fellowships

FOR FISCAL YEAR 1957

REGULAR POSTDOCTORAL

Institution and location	*Number of fellows*
Birkbeck College, London, England	1
California, University of, Berkeley, Calif	11
California, University of, Los Angeles, Calif	4
California, University of Southern, Los Angeles, Calif	1
California Institute of Technology, Pasadena, Calif	3
Cambridge University, Cambridge, England	1
Carlsberg Laboratory, Copenhagen, Denmark	1
Chicago, University of, Chicago, Ill	11
Columbia University, New York, N. Y	6
Cornell University, Ithaca, N. Y	2
Cornell University Medical College, Ithaca, N. Y	1
Harvard University, Cambridge, Mass	14
Harvard Medical School, Cambridge, Mass	1
Illinois, University of, Urbana, Ill	2
Indiana University, Bloomington, Ind	1
Iowa State College, Ames, Iowa	1
Johns Hopkins University, Baltimore, Md	1
Kansas, University of, Lawrence, Kans	1
Massachusetts Institute of Technology, Cambridge, Mass	2
Michigan, University of, Ann Arbor, Mich	5
New York, State University of, Syracuse, N. Y	1
Northwestern University, Evanston, Ill	2
Ohio State University, Columbus, Ohio	2
Pennsylvania, University of, Philadelphia, Pa	1
Pennsylvania State University, University Park, Pa	1
Princeton University, Princeton, N. J	5
Radcliffe Graduate School, Cambridge, Mass	1
Stanford University, Stanford, Calif	4
Texas, University of, Austin, Tex	1
Washington, State College of, Pullman, Wash	1
Washington, University of, Seattle, Wash	2
Washington University, St. Louis, Mo	1
Western Reserve University, Cleveland, Ohio	1
Western Reserve Medical School, Cleveland, Ohio	1
Wisconsin, University of, Madison, Wis	8
Yale University, New Haven, Conn	7

SENIOR POSTDOCTORAL

California, University of, Berkeley, Calif	4
California, University of, Davis, Calif	2
California, University of, Los Angeles, Calif	1
California, University of Southern, Los Angeles, Calif	1
California Institute of Technology, Pasadena, Calif	2
Carnegie Institute of Technology, Pittsburgh, Pa	2
Chicago, University of, Chicago, Ill	1

Present or Most Recent Institutional Affiliation of Individuals Awarded National Science Foundation Fellowships—Continued

Institution and location	*Number of fellows*
Colorado, University of, Boulder, Colo	1
Cornell University, Ithaca, N. Y	3
Georgia, University of, Athens, Ga	1
Harvard University, Cambridge, Mass	4
Illinois Geological Survey, Champaign, Ill	1
Illinois, University of, Urbana, Ill	3
Iowa State College, Ames, Iowa	1
Louisville, University of, Louisville, Ky	1
Massachusetts Institute of Technology, Cambridge, Mass	3
Michigan, University of, Ann Arbor, Mich	1
Minnesota, University of, Minneapolis, Minn	1
North Carolina, University of, Chapel Hill, N. C	1
U. S. Naval Postgraduate School, Monterey, Calif	1
Northwestern University, Evanston, Ill	2
Notre Dame, University of, Notre Dame, Ind	1
Oregon State College, Corvallis, Oreg	1
Pennsylvania, University of, Philadelphia, Pa	1
Princeton University, Princeton, N. J	1
Purdue University, Lafayette, Ind	1
Rutgers University, New Brunswick, N. J	1
Southern Illinois University, Carbondale, Ill	1
Stanford University, Stanford, Calif	1
Tufts University, Medford, Mass	1
Virginia, University of, Charlottesville, Va	1
Washington, University of, Seattle, Wash	i
Western Reserve University, Cleveland, Ohio	1
Wisconsin, University of, Madison, Wis	3
Worcester Foundation for Experimental Biology, Shrewsbury, Mass	1
Yale University, New Haven, Conn	2
Science Faculty	
Alabama Polytechnic Institute, Auburn, Ala	1
Alaska, University of, College, Alaska	2
Alma College, Alma, Mich	1
Aquinas College, Grand Rapids, Mich	1
Arizona, University of, Tucson, Ariz	1
Austin Peay State College, Clarksville, Tenn	1
Barnard College, New York, N. Y	1
Berea College, Berea, Ky	1
Brooklyn Polytechnic Institute, Brooklyn, N. Y	1
California, University of, Berkeley, Calif	1
California, University of, Davis, Calif	2
California, University of, Los Angeles, Calif	1
California, University of, Santa Barbara, Calif	1
Cincinnati, University of, Cincinnati, Ohio	1
Clark University, Worcester, Mass	1
Colorado, University of, Boulder, Colo	1
Cornell University, Ithaca, N. Y	2
Davidson College, Davidson, N. C	1

Present or Most Recent Institutional Affiliation of Individuals Awarded National Science Foundation Fellowships—Continued

Institution and location	*Number of fellows*
Denver, University of, Denver, Colo	1
Detroit, University of, Detroit, Mich	1
Drake University, Des Moines, Iowa	1
Drew University, Madison, N. J	1
Drexel Institute of Technology, Philadelphia, Pa	1
Florida, University of, Gainesville, Fla	1
Florida A. & M. University, Tallahassee, Fla	2
Fort Valley State College, Fort Valley, Ga	1
Furman University, Greenville, S. C	1
Georgia Institute of Technology, Atlanta, Ga	2
Gonzaga University, Spokane, Wash	1
Grand View College, Des Moines, Iowa	1
Hamilton College, Clinton, N. Y	1
Haverford College, Haverford, Pa	1
Hawaii, University of, Honolulu, T. H	1
Howard University, Washington, D. C	1
Illinois State Normal University, Normal, Ill	1
Iowa State Teachers College, Cedar Falls, Iowa	1
Johns Hopkins University, Baltimore, Md	1
Kansas State College, Manhattan, Kans	3
Lamar State College of Teaching, Beaumont, Tex	1
Lawrence College, Appleton, Wis	1
Long Island University, Brooklyn, N. Y	1
Manhattan College, New York, N. Y	2
Maryland, University of, College Park, Md	1
Miami University, Oxford, Ohio	1
Michigan, University of, Ann Arbor, Mich	1
Mississippi, University of, University, Miss	1
Morgan State College, Baltimore, Md	1
New Mexico, University of, Albuquerque, N. Mex	1
North Texas State College, Denton, Tex	1
Northeastern University, Boston, Mass	1
Northern Illinois State Teachers College, De Kalb, Ill	1
Oberlin College, Oberlin, Ohio	1
Occidental College, Los Angeles, Calif	1
Ohio State University, Columbus, Ohio	1
Ohio University, Athens, Ohio	1
Olivet College, Olivet, Mich	1
Oregon State College, Corvallis, Oreg	2
Pittsburgh, University of, Pittsburgh, Pa	1
Puget Sound, College of, Tacoma, Wash	1
Purdue University, Purdue, Ind	1
Rochester, University of, Rochester, N. Y	1
San Francisco, University of, San Francisco, Calif	1
South Dakota Southern State Teachers College, Springfield, S. Dak	1
Southern California, University of, Los Angeles, Calif	1
Southern State College, Magnolia, Ark	1
Southwest Texas State Teachers College, San Marcos, Tex	1
Stevens Institute of Technology, Hoboken, N. J	1

Present or Most Recent Institutional Affiliation of Individuals Awarded National Science Foundation Fellowships—Continued

Institution and location	*Number of fellows*
St. Lawrence University, Canton, N. Y	1
St. Mary's College, Winona, Minn	1
St. Thomas, College of, St. Paul, Minn	1
East Tennessee State College, Johnson City, Tenn	1
Tennessee, University of, Knoxville, Tenn	1
Texas, A. & M. College of, College Station, Tex	1
Texas College, Tyler, Tex	1
Tufts University, Medford, Mass	1
Tulane University, New Orleans, La	2
Ursuline College, Louisville, Ky	1
USAF Institute of Technology, Dayton, Ohio	1
Valparaiso University, Valparaiso, Ind	1
Vermont, University of, Burlington, Vt	1
Virginia, University of, Charlottesville, Va	1
Wake Forest College, Wake Forest, N. C	1
Washington University, St. Louis, Mo	2
Wesleyan University, Middletown, Conn	2
William Jewell College, Liberty, Mo	1
Wilson College, Chambersburg, Pa	1
Wisconsin, University of, Milwaukee, Wis	1
Wisconsin State College, Superior, Wis	1

APPENDIX E

Grants for the International Geophysical Year Program Fiscal Year 1957

Aurora and Airglow

Air Force Cambridge Research Center

Operation of 6-Station Antarctic Aurora and Airglow Network	$2,990
Operations at Sacramento Peak and Tonanzintla, Mexico	23,000
Operations at Thule, Greenland	26,455
Operations at 4 U. S. Stations and Saskatoon, Canada	6,000
Arctic Ice Floe Auroral Observations	1,550

University of Alaska

Procurement of All-Sky Cameras	3,000
Aurora and Airglow Operations in Alaska	217,030
Ionospheric Absorption, Cosmic Noise Method—Alaska	56,770

Arctic Institute of North America

Operation of 6-Station Antarctic Aurora and Airglow Network	46,360

Cornell University

Visual Aurora Observation Program	20,300
Aurora Data Reduction and Processing	81,780
Headquarters for All-Sky Cameras in United States	39,064
Operation of Auroral Radar at Ithaca	20,898
Operation of 6 All-Sky Cameras in United States	10,600

National Bureau of Standards

Procurement of Recording Photometers	1,586
Airglow Headquarters and Operation of 3 Stations	92,635

Stanford University

Auroral Radar Operations, Western United States	42,485
Meteor Radar Observations in the Antarctic	2,305
Ionospheric Absorption, Cosmic Noise Method—West	39,330

Cosmic Rays

California Institute of Technology

Balloon Flights With Ionization Chambers	23,500

University of California

Construction and Operation of Air Shower Detectors	3,300
Time Variations of Neutron, Hard, and Soft Cosmic Ray Components	22,700

University of Chicago	
Measurements of Neutron Intensity From Antarctic Icebreaker	$14,531
Measurements of Composition and Intensity of Primary Cosmic Radiations	92,415
Isotopic Constitution of Cosmic Radiation at Balloon Altitudes	10,700
Franklin Institute	
Distribution of Heavy Primary Cosmic Rays	16,000
Correlation of Solar Activity With High Altitude Primary Cosmic Ray Intensity	45,000
Shipboard Neutron Monitor Station	7,000
Construction and Operation of Neutron Monitor at Thule	12,000
State University of Iowa	
Solar Effects on Cosmic Rays at High Altitude in the Arctic	16,350
University of Maryland	
Construction and Operation of Cosmic Ray Monitor Telescope in the Antarctic	14,127
Construction and Operation of Cosmic Ray Monitor Telescope in the Arctic	8,208
Study of High-Speed Cosmic Ray Fluctuations	48,300
University of Minnesota	
Measurement of Cosmic Ray Intensity at High Altitudes	52,450
University of Missouri	
Measurement of Zenith-Angle Dependence of High-Energy Mu-Mesons	8,000
University of Nebraska	
Atmospheric, Geomagnetic, and Solar Influences on the Mu-Meson Component of Cosmic Radiation	14,140
Atmospheric, Geomagnetic, and Solar Influences on the Nucleonic Components of Cosmic Radiation	8,275
University of New Mexico	
Studies of the Semi-Diurnal Planetary Variation of Atmospheric Pressure	17,000
New York University	
Construction and Operation of Neutron Monitor in Alaska	23,300
Time Variations of Primary Cosmic Radiation Spectrum	28,200
Search for Neutrons of Solar Origin	27,200
University of Puerto Rico	
Variation of Cosmic Ray Ionizing Particles During Solar Flares	6,800
University of Rochester	
Energy and Charge Spectrum of Primary Cosmic Radiation	5,000
Southern Illinois University	
Heavy Primary Cosmic Rays	2,000

University of Washington	
Emulsion Studies of Heavy Primary Cosmic Rays	$1,500
Dr. Herman Yagoda	
Study of Low-Energy, Heavy Primary Cosmic Rays Near Magnetic Poles	1,500

GEOMAGNETISM

Air Force Cambridge Research Center	
Sub-Audio-Frequency Geomagnetic Fluctuations	30,000
University of California	
Operations at Jarvis and Palmyra Islands	31,000
Carnegie Institution of Washington	
Operation of South American Network	22,500
U. S. Coast and Geodetic Survey	
Operation of Geomagnetic Headquarters	40,100
Operation of Magnetic Observatories at 3 Antarctic Stations	1,400
Operation of Western Pacific Magnetic Observatories	61,750
Operation of East-West United States Geomagnetic Network	26,500
Operation of North-South Alaska Geomagnetic Network	24,400
Magnetic Gradient Studies in Alaska	2,600
Operation of Rapid-Run Auxiliary Magnetographs	42,300
Procurement and Operation of Visible-Recording Magnetic Variometers	11,300
Equipment for Jarvis and Palmyra Magnetic Stations	4,500
Operations at Antarctic Knox Coast Station	18,450
Operations at Antarctic Cape Adare Station	625
Equipment for South American Geomagnetic Network	20,000

GLACIOLOGY

American Geographical Society	
Observations in Southern Alaska	13,725
Glacier Photogrammetry and Mapping	66,700
Arctic Institute of North America	
Antarctic Glaciological Personnel	73,850
Operation of Glaciology Headquarters	16,450
Glaciology Program, Mt. Michelson, Alaska	45,115
Antarctic Glacial Geology	11,100
Department of the Army	
Arctic Logistics	35,000
California Institute of Technology	
Glacier Dynamics, Blue Glacier, Olympic Mountains, Wash	10,800
University of Washington	
Glacial Meteorology, Blue Glacier	37,260
Arctic Sea Ice Physics	18,500

Gravity Measurements

Arctic Institute of North America	
Antarctic Traverse Personnel	$4,760
University of California	
Mean Rigidity of the Earth	5,100
Columbia University	
Procurement of Gravimeter for the Antarctic	1,000
Submarine Pendulum Measurements of Gravity	40,000
Submarine Gravity Measurements	55,000
University of Wisconsin	
Procurement of Gravimeter for the Antarctic	3,000
Gravimeter Measurements	32,520
Woods Hole Oceanographic Institution	
Pendulum Measurement of Gravity	15,950

Ionospheric Physics

Air Force Cambridge Research Center	
Amateur Participation in IGY Ionospheric Physics Program	50,000
University of Alaska	
Ionospheric Absorption, Cosmic Noise Method—Alaska	15,300
Dartmouth College	
Atmospheric Whistler Program, Eastern Area	95,300
Sweep-Frequency Backscatter Measurements	28,000
Ionospheric Absorption, Cosmic Noise Method—Eastern Area	7,600
National Bureau of Standards	
Operation of Antarctic 6-Station Ionospheric Network	79,600
Personnel Training and Data Quality Control	18,530
Equatorial VHF Ionospheric Forward-Scatter Measurements	39,400
Radio Noise Measurement	3,100
Pennsylvania State University	
Ionospheric Absorption—Pulse Method	16,200
Ionosphere True Height Determination	18,800
Stanford University	
Atmospheric Whistler Program, Western Area	118,000
Fixed-Frequency Backscatter Measurements	202,100
University of Virginia	
Radio Star Scintillations and Atmospheric Winds	11,900

Longitude and Latitude

U. S. Coast and Geodetic Survey	
Operation of Hawaiian Station	11,000

Meteorology

Smithsonian Institution	
Earth Albedo Observations	20,953

U. S. Weather Bureau	
Operation of Antarctic 6-Station Meteorological Network	$150,485
Cooperative Operations of South America Upper Air Observations Stations	70,800
High Altitude Rawinsonde Observations	212,000
Operation of Antarctic Weather Central	49,160
Arctic Ice Floe Meteorology	78,500
Standardization of Ozone Spectrophotometers	16,400
OCEANOGRAPHY	
University of California	
Operation of Pacific Island Oceanographic Observatories	142,900
Deep Current Program, Pacific Ocean	362,830
CO_2 Analysis and Radiochemistry of Sea Water	55,840
Columbia University	
Operation of Atlantic Island Oceanographic Observatories	68,625
Deep Current Program, Atlantic Ocean	175,570
CO_2 Analysis and Radiochemistry of Sea Water	54,875
Department of the Interior	
Operation of Pacific Island Oceanographic Observatories	11,300
Texas Agricultural and Mechanical College	
Deep Current Program, Atlantic Ocean	46,055
CO_2 Analysis and Radiochemistry of Sea Water	25,000
University of Washington	
Operation of North Pacific Island Oceanographic Observatories	11,400
Deep Current Program, Pacific Ocean	24,675
CO_2 Analysis of Sea Water	16,000
Thermal Budget of Arctic Sea Ice	45,000
Woods Hole Oceanographic Institution	
Deep Current Program, Atlantic Ocean	177,245
CO_2 Analysis and Radiochemistry of Sea Water	22,750
Arctic Oceanography	6,000
ROCKETRY	
University of Michigan	
Scientific Instrumentation for Aerobee Rockets	75,500
Office of Naval Research	
Rocket Program in the Pacific San Diego High Area	100,000
Aerobee Rocket Program at Fort Churchill, Canada	13,064
SEISMOLOGY	
Arctic Institute of North America	
Personnel for Antarctic Stations and Traverse Parties	3,070
California Institute of Technology	
Study of Crustal Strain Accumulation	59,200
University of California	
Seismic Sea Exploration of Southeast Pacific Ocean	42,500

Carnegie Institution of Washington	
Seismic Exploration of Continental Structure	$34,050
U. S. Coast and Geodetic Survey	
Antarctic Teleseismic Measurements	4,100
Pacific Island Seismograph Measurements	9,900
Columbia University	
Seismic Exploration of Atlantic Ocean	13,820
Study of Long-Period Seismic Waves	37,200
Study of Lg Phase	7,700
Arctic Seismology	7,500
University of Wisconsin	
Seismic Exploration of Coastal Structure	20,400
SOLAR ACTIVITY	
University of California	
Flare and Plage Patrol—Mt. Wilson	10,000
University of Hawaii	
Solar Radio Noise Patrol	2,750
Solar Activity Flare Patrol	5,000
High Altitude Observatory	
Instrumentation for Indirect Detection of Flares	5,000
Operation at Boulder and Climax Observatories	15,500
Rapid Data Presentation	6,800
University of Michigan	
High Resolution Profiles of Hydrogen Alpha in Solar Flares	7,750
Flare Patrol Operations	7,650
Office of Naval Research	
Procurement of Flare Patrol Instruments and Filters	1,200
WORLD DAYS	
National Bureau of Standards	
Operation of United States and World Warning System	115,100
GENERAL RELATED SCIENTIFIC SUPPORT	
National Academy of Sciences	
U. S. IGY Contribution to International Council of Scientific Unions	25,000
Antarctic Scientific Supervision Costs	200,000
IGY Regional Programs Office	33,700
IGY Scientific Inspection and Coordination	30,000
IGY Technical Publications	93,480
U. S. Weather Bureau	
Antarctic Planning Staff	18,000
Procurement of Miscellaneous Supplies for Antarctic Bases	24,500

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WORLD DATA CENTER

University of Alaska	
Operation of Primary Data Archive for Aurora	$92,690
American Geographical Society	
Operation of Primary Data Archive for Glaciology	36,093
U. S. Coast and Geodetic Survey	
Operation of Primary Data Archive for Geomagnetism, Gravity, and Seismology	58,200
Cornell University	
Operation of Primary Data Archive for Aurora	40,750
High Altitude Observatory	
Operation of Primary Data Archive for Solar Activity	40,250
University of Minnesota	
Operation of Primary Data Archive for Cosmic Rays	31,205
National Academy of Sciences	
Operation of U. S. World Data Center Coordination Office	54,840
National Bureau of Standards	
Operation of Primary Data Archive for Airglow and Ionosphere	46,275
Texas Agricultural and Mechanical College	
Operation of Primary Data Archive for Oceanography	26,628
U. S. Weather Bureau	
Operation of Primary Data Archive for Meteorology	12,000

EARTH SATELLITE—SCIENTIFIC EXPERIMENTS

Department of the Army	
Instrumentation for Meteorological Observations	58,000
California Institute of Technology	
Instrumentation for Cosmic Light and Radiation Measurements	34,500
Franklin Institute	
Instrumentation for Measurement of Flux of Cosmic Ray Nuclei	15,000
State University of Iowa	
Instrumentation for Cosmic Ray Observations	38,525
University of Maryland	
Instrumentation for Measurement of Meteoric Dust Erosion of Satellite	24,150
Office of Naval Research	
Instrumentation for Environmental Measurements	293,500
Instrumentation for Solar Lyman Alpha Measurements	223,500
Instrumentation for Magnetometer Measurements	112,000
Satellite Special Equipment and Engineering Services	187,500

Research Institute for Advanced Studies	
Instrumentation for Measurement of Flux of Cosmic Ray Nuclei	$15,000
University of Wisconsin	
Instrumentation for Radiation Balance Experiment	58,600
EARTH SATELLITE—RADIO TRACKING	
Office of Naval Research	
Equipment Procurement for Radio Tracking Stations	5,500,000
Orbit Computations Using Radio Data	463,000
EARTH SATELLITE—TELEMETERING OF SCIENTIFIC DATA	
Office of Naval Research	
Telemetering of Scientific Data	846,000
EARTH SATELLITE—SCIENTIFIC COORDINATION	
National Academy of Sciences	
Scientific Coordination of Earth Satellite Program	4,400
EARTH SATELLITE—OPTICAL TRACKING	
Smithsonian Institution	
Equipment Procurement and Installation for Optical Tracking Stations	445,275
Operation of Optical Tracking Stations	50,600
Visual Observing Program	10,000
Operation of Computation and Analysis Center	20,000
Administration of Optical Tracking Program	60,000
	$14,695,997

APPENDIX F

Financial Report for Fiscal Year 1957

SALARIES AND EXPENSES APPROPRIATION

Receipts

Appropriation for fiscal year 1957	$40,000,000	
Unobligated balance from fiscal year 1956	182,524	
Total		$40,182,524

Obligations

National science policy studies	$664,561	
Support of science:		
Grants for support of research projects:		
Biological and medical sciences	7,360,794	
Mathematical, physical, and engineering sciences	7,618,521	
Social science research	289,100	
Grants for support of research facilities:		
Biological and medical sciences	884,800	
Mathematical, physical, and engineering sciences	4,496,899	
Grants for training of scientific manpower:		
Graduate fellowships	3,353,605	
Education in the sciences	10,947,711	
Program evaluation	77,518	
The President's Committee on Scientists and Engineers	117,517	
Review of Research and Training	1,020,143	
Subtotal	36,166,608	
Scientific information exchange:		
Dissemination of scientific information	994,736	
Attendance at international scientific meetings	122,069	
Subtotal	1,116,805	
Executive direction and management	682,017	
Total obligations		38,629,991
Unobligated balance carried forward to fiscal year 1958		[1] 1,552,533

[1] A substantial portion of the unobligated balance represents adjustments required by sec. 1311 of Public Law 663 and is reserved for prior commitments of the Foundation, such as the purchase of land for the National Radio Astronomy Observatory.

INTERNATIONAL GEOPHYSICAL YEAR APPROPRIATION

Receipts

Unobligated balance from fiscal year 1956	$32,373,962

Obligations

Technical program	$14,733,941	
Administrative expense, National Academy of Sciences-National Research Council	252,842	
Administrative expense, National Science Foundation	50,115	
Total obligations		15,036,898
Unobligated balance carried forward to fiscal year 1958		[1] 17,337,064

TRUST FUND

Receipts

Unobligated balance from fiscal year 1956	$3,006	
Donations from private sources	1,131	
Total		$4,137

Obligations

Miscellaneous expenses approved by the Director	134
Unobligated balance carried forward to fiscal year 1958	4,003

SYNTHETIC RUBBER RESEARCH PROGRAM

Receipts

Unobligated balance from fiscal year 1956	$81,178	
Reappropriation Public Law 814, 84th Congress	500,000	
Total Receipts		$581,178

Obligations

Research	$437,100	
Administrative	58,075	
Total	495,175	
Less income from laboratories	53,773	
Total obligations		441,402
Less withdrawals by Treasury Department		139,776
Unobligated balance		

[1] The unobligated balance is available until June 30, 1960.

APPENDIX G

Publications Resulting From National Science Foundation Grants Fiscal Year 1957

This bibliography of some 850 items lists all grantee papers for which the Foundation received publication information during fiscal year 1957. Notification of publication usually was in the form of a reprint or copy of the grantee's paper or book. Approximately 190 grantee institutions are represented. Because of time-lags between completion of research and publication of results, much of the experimentation covered by these papers was carried on prior to fiscal year 1957, while the results of a great deal of fiscal year 1957 research will be reported in papers appearing in later lists.

The arrangement of entries is designed to facilitate reference use of the compilation. Items are grouped by National Science Foundation divisions or offices, by programs within each division, and alphabetically by grantee institution within each program. The table of contents lists the divisions and subject programs under which research grants are made.

Division of Biological and Medical Sciences

Anthropological and Related Sciences

HARVARD UNIVERSITY, G. R. WILLEY

Willey, Gordon R. The Structure of Ancient Maya Society: Evidence from the Southern Lowlands. American Anthropologist, *58:* 777–782 (Oct. 1956).

UNIVERSITY OF OREGON, L. S. CRESSMAN

Miller, Loye. Bird Remains from an Oregon Indian Midden. Condor, *59:* 59–63 (Jan. Feb. 1957).

WENNER-GREN FOUNDATION FOR ANTHROPOLOGICAL RESEARCH, INC., W. L. THOMAS, Jr.

Thomas, William, Jr., Ed. Man's Role in Changing the Face of the Earth. 1,193 pp. Chicago, Ill., University of Chicago Press, 1956.

Developmental Biology

BROWN UNIVERSITY, P. B. WEISZ

Weisz, Paul B. Chemical Inhibition of Regeneration in Stentor Coeruleus. Journal of Cellular and Comparative Physiology, *46:* 517–527 (Dec. 1955).

Weisz, Paul B. Experiments on the Initiation of Division in Stentor Coeruleus. Journal of Experimental Zoology, *131:* 137–162 (Feb. 1956).

UNIVERSITY OF CALIFORNIA, BERKELEY, R. Y. STANIER

Griffiths, Mary, W. R. Sistrom, Germaine Cohen-Bazire, R. Y. Stanier, and M. Calvin. Function of Carotenoids in Photosynthesis. Nature, *176:* 1211–1215 (Dec. 1955).

Griffiths, Mary, and R. Y. Stanier. Some Mutational Changes in the Photosynthetic Pigment System of *Rhodopseudomonas spheroides.* Journal of General Microbiology, *14:* 698–715 (June 1956).

Sistrom, W. R., Mary Griffiths, and R. Y. Stanier. A Note on the Porphyrins Excreted by the Blue-Green Mutant of Rhodopseudomonas Spheroides. Journal of Cellular and Comparative Physiology, *48:* 459–472 (Dec. 1956).

Sistrom, W. R., Mary Griffiths, and R. Y. Stanier. The Biology of a Photosynthetic Bacterium Which

Division of Biological and Medical Sciences—Continued

Developmental Biology—Continued

Lacks Colored Carotenoids. Journal of Cellular and Comparative Physiology, *48:* 473–515 (Dec. 1956).

UNIVERSITY OF CHICAGO, S. L. WASHBURN

Mednick, Lois W., and S. L. Washburn. The Role of the Sutures in the Growth of the Braincase of the Infant Pig. American Journal of Physical Anthropology, *14:* 175–191 (June 1956).

GRINNELL COLLEGE, G. MENDOZA

Mendoza, Guillermo. Adaptations During Gestation in the Viviparous Cyprinodont Teleost, Hubbsina Turneri. Journal of Morphology, *99:* 73–95 (July 1956).

MARQUETTE UNIVERSITY, J. W. SAUNDERS, Jr.

Saunders, J. W., L. C. Saunders, and M. T. Gasseling. The Morphogenetic Role of Cell Deaths in the Origin of the External Contours of the Limbs in the Chick. Anatomical Record, *127:* 360–361 (1957).

UNIVERSITY OF MICHIGAN, N. E. KEMP

Kemp, Norman E. Differentiation of the Cortical Cytoplasm and Inclusions in Oocytes of the Frog. Journal of Biophysical and Biochemical Cyotology, *2:* 187–190+ (July 1956).

Kemp, Norman E. Electron Microscopy of Growing Oocytes of Rana Pipiens. Journal of Biophysical and Biochemical Cytology, *2:* 281–292+ (May 1956).

Kemp, Norman E. Localization of Glycine-2-C^{14} Injected into Adult Female Frogs. Journal of Experimental Zoology, *133:* 227–239 (Nov. 1956).

UNIVERSITY OF PENNSYLVANIA, C. E. WILDE, Jr.

Wilde, Charles E., Jr. The Urodele Neuroepithelium. III. The Presentation of Phenylalanine to the Neural Crest by Archenteron Roof Mesoderm. Journal of Experimental Zoology, *133:* 409–440 (Dec. 1956).

RICE INSTITUTE, R. V. TALMAGE, AND A. C. ENDERS

Buchanan, G. D., A. C. Enders, and R. V. Talmage. Implantation in Armadillos Ovariectomized During the Period of Delayed Implantation. Journal of Endocrinology, *14:* 121–128 (1956).

ST. AMBROSE COLLEGE, W. F. LYNCH

Lynch, William F. Experimental Modification of the Rate of Metamorphosis of Bugula Larvae. Journal of Experimental Zoology, *133:* 589–612 (Dec. 1956).

SOCIETY FOR THE STUDY OF DEVELOPMENT OF GROWTH, V. C. TWITTY

Rudnick, Dorothea, Ed. Cellular Mechanisms in Differentiation and Growth. 236 pp. Princeton, N. J., Princeton University Press, 1956.

UNIVERSITY OF TENNESSEE, R. C. FRASER

Fraser, Ronald C. The Presence and Significance of Respiratory Metabolism in Streak-Forming Chick Blastoderms. Biological Bulletin, *111:* 77–91 (Aug. 1956).

Fraser, Ronald C. Somite Genesis in the Chick. 1. Partial Characterization of Stimulatory Factors in Egg White. Growth, *21:* 29–43 (1957).

Fraser, Ronald C. Studies on the Hypoblast of the Young Chick Embryo. Journal of Experimental Zoology, *126:* 349–399 (Aug. 1954).

TEXAS AGRICULTURAL EXPERIMENT STATION, J. N. WEAVER

Weaver, Nevin. Ovarian Development of Worker Honey Bees. Journal of Economic Entomology, *49:* 854–857 (Dec. 1956).

UNIVERSITY OF VIRGINIA, M. S. MCKEEHAN

McKeehan, Morris S. The Relative Ribonucleic Acid Content of Lens

Division of Biological and Medical Sciences—Continued

Developmental Biology—Continued

and Retina During Lens Induction in the Chick. American Journal of Anatomy, *99:* 131–155 (July 1956).

UNIVERSITY OF WASHINGTON, SEATTLE, W. S. HSU

Hsu, W. Siang. Oogenesis in the Bdelloidea Rotifer Philodina Roseola Ehrenberg. La Cellule, *62:* 283–296 (1956).

UNIVERSITY OF WISCONSIN, K. B. RAPER

Raper, Kenneth B. *Dictyostelium polycephalum* n.sp.: a New Cellular Slime Mould with Coremiform Fructifications. Journal of General Microbiology, *14:* 716–732 (June 1956).

RAPER, KENNETH B. Factors Affecting Growth and Differentiation in Simple Slime Molds. Mycologia, *48:* 169–205 (Mar.–Apr. 1956).

UNIVERSITY OF WYOMING, C. S. THORNTON

Thornton, Charles Stead. The Relation of Epidermal Innervation to the Regeneration of Limb Deplants in Amblystoma Larvae. Journal of Experimental Zoology, *133:* 281–299 (Nov. 1956).

YALE UNIVERSITY, J. P. TRINKAUS

Trinkaus, J. P. The Differentiation of Tissue Cells. American Naturalist, *90:* 273–288 (Sept.–Oct. 1956).

Trinkaus, J. P., and John W. Drake. Exogenous Control of Morphogenesis in Isolated Fundulus Blastoderms by Nutrient Chemical Factors. Journal of Experimental Zoology, *132:* 311–347 (July 1956).

Environmental Biology

AMERICAN GEOGRAPHICAL SOCIETY, C. J. HEUSSER

Heusser, C. J. Third National Pollen Conference. Geographical Review, *46:* 579–580 (1956).

AMERICAN MUSEUM OF NATURAL HISTORY, C. M. BREDER, Jr.

Rasquin, Priscilla. Cytological Evidence for a Role of the Corpuscles of Stannius in the Osmoregulation of Teleosts. Biological Bulletin, *111:* 399–409 (Dec. 1956).

Rasquin, Priscilla. Observations on the Metamorphosis of the Bonefish, Albula Vulpes (Linnaeus). Journal of Morphology, *97:* 77–117 (July 1955).

CARLETON COLLEGE, J. B. GUYSELMAN

Guyselman, J. Bruce. Solar and Lunar Rhythms of Locomotor Activity in the Crayfish Cambarus Virilis. Physiological Zoölogy, *30:* 70–87 (Jan. 1957).

DARTMOUTH COLLEGE, F. H. BORMANN

Bormann, F. H. Moisture Transfer between Plant through Intertwined Root Systems. Plant Physiology, *32:* 48–55 (Jan. 1957).

DUKE UNIVERSITY, P. J. KRAMER

Kramer, Paul. Some Effects of Various Combinations of Day and Night Temperatures and Photoperiod on the Height Growth of Loblolly Pine. Forest Science, *3:* 45–55 (Mar. 1957).

STATE UNIVERSITY OF IOWA, G. E. FOLK, Jr.

Farrand, Richard L., G. Edgar Folk, Jr., and Marvin L. Riedesel. Types of Mammalian Hibernation. Proceedings of the Iowa Academy of Science, *63:* 724–728 (Dec. 1956).

Riedesel, Marvin L., and G. Edgar Folk, Jr. Serum Magnesium Changes in Hibernation. Nature, *177:* 668 (Apr. 1956).

UNIVERSITY OF MIAMI, H. B. MOORE

Moore, Hilary B. The Effects of Temperature, Illumination, and Pressure on the Vertical Distribution of Zooplankton. Bulletin of Marine Science of the Gulf and Caribbean, *6:* 73–363 (Dec. 1956).

NEW MEXICO HIGHLANDS UNIVERSITY, L. M. SHIELDS

Shields, Lora Mangum. Zonation of Vegetation within the Tularosa

Division of Biological and Medical Sciences—Continued

Environmental Biology—Continued

Basin, New Mexico. Southwestern Naturalist, *1:* 49–68 (Apr. 1956).

Shields, Lora Mangum, and Joe Crispin. Vascular Vegetation of a Recent Volcanic Area in New Mexico. Ecology, *37:* 341–351 (Apr. 1956).

UNIVERSITY OF NEW MEXICO, C. C. HOFF

Hoff, C. Clayton. Pseudoscorpions of the Family Chernetidae from New Mexico. American Museum Novitates, No. 1800, Oct. 1956, 66 pp.

STANFORD UNIVERSITY, W. C. BROWN

Alcala, Angel C., and Walter C. Brown. Early Life History of Two Philippine Frogs with Notes on Deposition of Eggs. Herpetologica, *12:* 241–246 (1956).

Brown, Walter C. A Revision of the Genus *Brachymeles* (*Scincidae*), with Descriptions of New Species and Subspecies. Breviora, Museum of Comparative Zoology, No. 54, June 1956, 19 pp.

Brown, Walter C., and Alfredo Y. Reyes. Philippine Lizards. Observations on the Incubation Period and on Hatchlings of Several Oviparous Species. Silliman Journal, *3:* 139–143 (1956).

Brown, Walter, and Angel Alcala. Observations on Amphibians of the Mt. Halcon and Mt. Canlaon Areas, Philippine Islands. Silliman Journal, *2:* 93–102 (Apr. 1955).

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APPENDIX H

Publications of the National Science Foundation

This listing includes publications issued by the National Science Foundation through fiscal year 1957. A more complete listing of Foundation publications, including those released after the close of the fiscal year, may be obtained upon request to the 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.

Federal Support for Science Students in Higher Education, 1954. 30 cents.

Organization of the Federal Government for Scientific Activities. $1.75.

Research and Development by Nonprofit Research Institutes and Commercial Laboratories, 1953. 50 cents.

Research by Cooperative Organizations. 35 cents.

Science and Engineering in American Industry. Final Report on a 1953–1954 Survey. 70 cents.

Scientific Research Expenditures by the Larger Private Foundations. 25 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.

V. The Federal Research and Development Budget, Fiscal Years 1955, 1956, and 1957. 35 cents.

Reviews of Data on Research and Development

These publications are in the form of leaflets published at irregular intervals and devoted to specific aspects of research and development. The first issue was published at the close of 1956, with the following issues having been published since that time:

Expenditures for Research and Development in the United States, 1953.

Funds for Research and Development in Colleges and Universities, 1953–54.

Funds for Research in Medical Schools, 1953–54.

Exchange of Foreign and American Graduate Students in the Sciences, Engineering, and Other Fields.

Funds for Basic Research in the United States, 1953.

Copies of these leaflets may be obtained from the National Science Foundation, Washington 25, D. C.

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.

Manpower Resources in Physics, 1951. 20 cents.

Manpower Resources in Chemistry and Chemical Engineering. Out of print.

Manpower Resources in Mathematics. 20 cents.

Manpower Resources in the Earth Sciences. 45 cents.

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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 to 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.

Employment Profile of Scientists in the National Register of Scientific and Technical Personnel, 1954–55.

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 listed *Proceedings* may be obtained upon request to the Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.

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.

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. $1.75 ($1.50 to AAAS members).

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. $1.50.

Translation Monthly. Subscription price: $5 per year. May be ordered from Special Libraries Association Scientific Translations Center, John Crerar Library, 86 East Randolph Street, Chicago 1, Ill.

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 to the Office of Technical Services.

Translation of the following Russian journals is being supported by the National Science Foundation and may be obtained from—

American Institute of Physics
335 East 45th Street
New York 17, N. Y.

Soviet Physics—JETP (Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki). Monthly. Subscription price, $60 per year. Single copy, $6.

Journal of Technical Physics (Zhurnal Teknicheskoi Fiziki). Monthly. Subscription price, $90 per year. Single copy, $9.

Acoustics Journal (Akusticheskii Zhurnal). Quarterly. Subscription price, $20 per year. Single copy, $6.

Proceedings of the USSR Academy of Sciences—Physics Articles (Doklady Akademii Nauk SSSR). Bimonthly. Subscription price, $25 per year. Single copy, $6.

American Institute of Biological Sciences
2000 P Street NW.
Washington 6, D. C.

Microbiology (Mikrobiologiia). Bimonthly. Subscription price, $20 per year.

Plant Physiology (Fiziologii Rastenii). Bimonthly. Subscription price, $15 per year.

Proceedings of the USSR Academy of Sciences (Doklady)

Biological Sciences Articles. Bimonthly. Subscription price, $20 per year.

Botanical Sciences Articles. Bimonthly. Subscription price, $7.50 per year.

American Mathematical Society
190 Hope Street
Providence 6, R. I.

American Mathematical Society Translations (Selected Translations from Russian Mathematical Literature). Series 2—volumes 1, 2, 3, and 4, approximately $3.50 each; volume 5, $4.30; volume 6, $5.20.

The following translations were published with the aid of a grant from the National Science Foundation. They may be ordered from Pergamon Press, 122 East 55th Street, New York 22, N. Y., or 4, Fitzroy Square, London, W. 1, England:

Bulletin of the Academy of Sciences of the USSR—Geophysics Series (Izvestiia Akademii Nauk SSSR—Seriia Geofizicheskaia). Monthly. Subscription price, $25 per year.

Abstracts of the Eastern European and Continental China Papers in Geophysics.

Bimonthly. Subscription price, $25 per year.

Committees and Special Reports

Publications Resulting From National Science Foundation Research Grants, Through Fiscal Year Ending June 30, 1956. 30 cents.

Report of the Advisory Committee on Minerals Research to the National Science Foundation, 1956.

Report of the Advisory Panel on High-Energy Accelerators to the National Science Foundation.

Government Research Information

Government Research Information, A Program of the Office of Scientific Information. A brochure describing an NSF-sponsored program designed to make unclassified, scientific reports on Government-supported research readily available to United States scientists. Available upon request from NSF Office of Scientific Information, attention GRI.

Grants for Scientific Research

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

Fellowship Announcements

Announcements of the National Science Foundation fellowship program, with instructions for applying. Annual announcement of predoctoral program; semiannual announcement of postdoctoral, senior postdoctoral, and science faculty programs.

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 President's Committee on Scientists and Engineers.

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