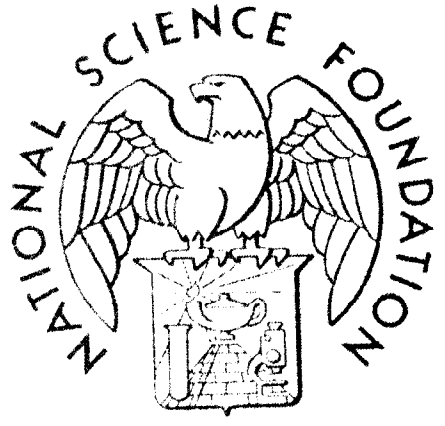
National Science Foundation

8th *Annual Report, 1958*



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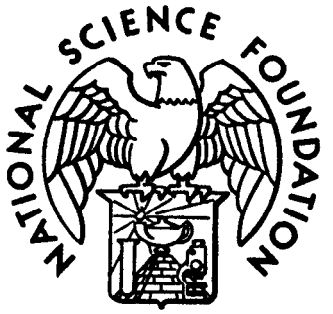
National Science Foundation

Eighth Annual Report for the Fiscal Year Ended June 30, 1958



LETTER OF TRANSMITTAL

WASHINGTON, D. C.,
January 15, 1959.

MY DEAR MR. PRESIDENT:

I have the honor to transmit herewith the Annual Report for Fiscal Year 1958 of the National Science Foundation for submission to the Congress as required by the National Science Foundation Act of 1950.

Respectfully,

ALAN T. WATERMAN,
Director, National Science Foundation.

The Honorable
The President of the United States.

CONTENTS

CHAIRMAN'S FOREWORD

Throughout this year there has been much discussion of the significance and quality of scientific research and education in our country. This has led some to recognize that a vigorous, wholesome national life requires more widespread respect for intellectual effort; they have advocated the need and satisfactions of hard mental work. But many have laid the blame for present shortcomings on unrespected, poorly supported teachers and investigators or have sought to satisfy their responsibility for the future of our country by merely advocating greater expenditures for scientific facilities and some for teachers.

More adequate financial support for science is of course essential if science is to flourish as a basic element of our national culture; it is needed to insure the well being of our people and their security against foreign aggression. The financial support provided is no less important as a measure of the value the citizens and government of our country place on science.

There have been buoyant times when Americans have been encouraged to believe they could do all things. That is a pleasant delusion of immaturity. One determinant of a nation's greatness is its courage to choose between the important and the less important. A nation achieves greatness by determined devotion to the things that matter most as it sacrifices the unessential.

During debates on how much our Federal, State, and municipal governments can afford to spend on scientific teaching and research, it is well to remember that the sums provided in the debated budgets represent human effort. How much of the life of the citizens of our country will be devoted to training the minds of our youth, to the discovery of new knowledge and its applications, and to the welfare of mankind depends on the will and wisdom of the people and their elected representatives in

government. If the trivial and unimportant are chosen, there will be less for ennobling, creative efforts.

These are matters which have concerned the National Science Board as they have endeavored to shape the National Science Foundation into an institution for building a better way of life. Our responsibilities far exceed the disbursement of Federal funds and the formulation of Federal programs and policies affecting science. We have the unavoidable opportunity to use our funds and functions as means for encouraging, by example and assistance, countless people and institutions to devote more of their material and intellectual efforts to science. We can thus further science as one of the great adventures of the human mind.

But science is only one of those adventures on the frontiers of the mind and spirit. Science and technology have released great powers for the vast development of a material civilization. Only if scientists vigorously foster the spiritual as well as the material values of science will scientific progress make possible a life that ennobles man and is rewarding.

DETLEV W. BRONK,
Chairman, National Science Board.

DIRECTOR'S STATEMENT

Now that a year has elapsed since this country was dramatically brought face to face with the need for critical examination of its national effort in science and technology, it is appropriate to consider our progress and to gauge the follow-through of the President's stirring and realistic messages to the country during November 1957.

In particular, attention was directed to the urgent need for developing to the fullest our capabilities in science and engineering research and our education and training in science and engineering.

Some notable progress has been made and some major accomplishments undertaken. The President's appointment of a Special Assistant for Science and Technology, backed by a distinguished Science Advisory Committee, has been widely acclaimed. The National Defense Education Act constitutes a forward-looking move to assist in the improvement of our system of education. Steps were taken to increase Federal support of basic research, and plans have materialized in the formation of a new agency, the National Aeronautics and Space Administration, to deal with the urgent problem of space research and exploration. Military research and technology have received increased emphasis in keeping with current national defense goals. The President has proposed plans for reorganization of the Department of Defense designed to improve materially the effectiveness of our military potential.

The Government has taken these constructive steps. It is now fair to ask: are these enough? Are we as a nation proceeding forthrightly to accomplish what is necessary for maximum progress in science and technology, and for the improvement in the education and training of our young people? Furthermore,

are we acting with the promptness which the situation demands? Or is there evidence that, as a rebound from our intense interest of a year ago, we are in danger of again becoming complacent? As a single illustration, one need only compare the reaction of the public to the launching of the first sputnik with that manifested at the third launching in May.

The answer is that we have only made a beginning; the major job is still to be done. In the field of education, there seems to be no immediate prospect of adequate salaries for school teachers, of adequate school buildings and facilities, nor of adequate incentives for recruiting the numbers of competent teachers we shall require. Congress shows caution about taking action, as do most of the States; the scientific and educational societies lack funds; and local attempts outside of a few wealthy suburban communities have come up against the realization that adequate funds are not available for the purpose until something is done about taxes.

As for the support of scientific research, it is generally recognized that the modern dependence of a country upon its technology requires thorough attention to its progress in science. The key to the latter lies in the support of basic research. Forward thinking and plans for dealing with important areas of research have not as yet shown indication of full realization in budget terms. The immediacy here lies in insuring the health and strength of science and engineering in the graduate schools of our colleges and universities, which constitute the stronghold for basic research and for the advanced training of scientists and engineers. The pressing problem for science and engineering in universities is to secure modern laboratories and research equipment, including rather costly equipment for the larger institutions, and to provide for large capital research facilities to be used nationally or at regional centers. In the interest of training future scientists, needs extend to undergraduate laboratories and demonstration equipment. Not to be forgotten are the fundamental needs of our colleges and universities for funds freely usable for maintenance and operation; these are the most difficult of all to secure.

In the meantime, the evidence from other countries and nota-

bly the U. S. S. R. shows a determination and a national spirit on the part of the people which seems to be relatively absent from the American scene. The recent educational group which went to the U. S. S. R. with the Commissioner of Education, and likewise the group of university presidents, came away with the conviction that the Russian people see their way clear to world leadership in science and technology. They are apparently dedicated to this—not in the sense of military competition, but rather of achieving world supremacy without the need of military domination. Among other nations, we shall ultimately have to reckon with the genius for organization and the industry of the German people, the industry and learning ability of the Japanese and the industry and potentialities of the Chinese.

As a nation we appear to forget that we live in a competitive world and shall continue to do so. It seems abundantly clear that we shall rapidly lose in competition, unless we can show more determined and constructive efforts than we have during the past years.

It is clear that success in the requisite effort depends fundamentally upon the understanding of the problem by our people and our determination to achieve these goals. Under our democratic system, no segment of Government, whether Federal, State, or local, can succeed in securing necessary action programs or funds to carry them out unless our citizens understand, actively endorse, and indeed participate in the steps that need to be taken. In short, the wholehearted cooperation of the people of the country is necessary to achieve the goals which the President has pointed out so clearly. Most important here is a realization that this is not a single emergency but a continuing—possibly a permanent—one. In this modern world there can be no relaxation of a determination to compete successfully and continuously.

Admittedly these questions are complicated by several issues: (a) the need and extent to which the Federal Government should take action and provide funds for education and for educational institutions in the face of a traditional policy of leaving such matters to State and local authorities; (b) the development of our full capabilities for national security and world competi-

tion without jeopardizing our economy; (c) the realization of national goals while maintaining individual initiative and achievement of individual wants and ambitions; (d) attainment of full development of individual talents and aptitudes while dealing satisfactorily with the demands for education for all.

While these questions are important and should be resolved, we dare not allow these to becloud the main issue—we must progress in our science and technology and in the education and training of our citizens with all the effectiveness and thoroughness we can muster. We cannot afford to delay in arguments as to how we do them.

During the past year the recession has brought us face to face with one of our most serious difficulties, namely, how we can develop our full capabilities and still remain financially solvent—in other words, how to provide for the increasingly costly technological developments necessary for national security without endangering the Nation's economy. A grave danger here is that, for reasons of economy, we fall short of developing our capabilities in science and technology.

We can only insure the *possibility* of full protection of national security by giving every encouragement to scientific research (as contrasted with development and production). It is only in this way that we can achieve the ideas and the breakthroughs which promise clear superiority; it is only in this way we can insure that the developments we undertake are modern and up-to-date in every detail. The results of such research, in competent hands, are never without value. Even when no breakthroughs appear, the total effort always brings a possible breakthrough closer.

It should be noted that the costs of research are very small as compared with those of development. Only about four percent of national funds for research and development go into basic research.

As history amply records, the most epoch-making scientific discoveries have come from basic research. But basic research, being exploration into the unknown by its very nature cannot predict exactly where these breakthroughs will occur. There-

fore, comprehensive support of research has to be undertaken in order to overlook no opportunities. This should be regarded as an investment, the precise spots where high returns occur being unknown in advance. With full support of research, both basic and applied, we then have full exploitation of the potentialities for development and production. Incidentally, by the support of basic research we gain as an important byproduct the advanced training of young scientists.

It is worth noting that during the hard times of the 1930's forward-looking technical industries increased their research efforts and this policy paid off.

Then, in order to protect the national economy, the important point is to exercise extreme care beforehand in planning for the costly development and the production which can emerge from among the possibilities identified by research. By careful selection of the developments and undertakings which have most promise and the highest priority, we contribute in considerable measure to the protection of a balanced national budget.

What has just been said in the area of science and technology seems capable of extension to our planning as a nation.. The question is whether even under the most favorable circumstances our economy is prepared to cope with the costs in effort and money required for the increasingly many and varied opportunities that lie before us. Speaking literally, this has never been possible. The new factor which has been entering the picture by degrees and is now prominent is that as a nation we shall have to pay even greater attention to our objectives and to the priorities among them.

This point is brought into sharp focus in connection with our present subject. There is an apparent lack of realization and determination on the part of our citizens to advance progress in education and in science. Without this realization and determination it is not possible to act with the promptness which is required. Although the facts have received much publicity and should be pretty generally known, it becomes increasingly clear that these do not at present appear truly to be national objectives, as understood by the people.

Perhaps what is missing is a clear conception on the part of our citizens of what our objectives are as a nation and more importantly how we can achieve them, and most important of all, what each citizen's responsibility is in cooperating. There would probably be found general agreement on our traditional objective of peace and prosperity—"the pursuit of happiness." However, we do not seem to understand that it will be impossible to maintain our own prosperity and world peace unless we do and do promptly the things necessary to compete in a modern world. What is meant by this? Simply to develop our capabilities, both individually and collectively, to the fullest and then, in order to maintain a sound economy, identify and select the areas of endeavor which should engage our fullest attention in terms of money and effort. In science we should put maximum emphasis upon the relatively modest needs of basic research in order to learn all the possibilities of progress in technology and then choose carefully the fields for development that require large capital sums.

To be sure, a preliminary responsibility lies with the Federal Government to take the lead in the solution of these problems, but to provide full solution requires the understanding and the cooperation of all citizens. The responsibility of the Federal Government then is: (a) to insure that the problem is entirely understood by the people; (b) to provide direct support according to carefully devised plans; (c) to consider seriously ways and means of increasing substantially funds from other sources. The responsibility of the people is first to give these problems their careful attention and, second, to determine, as their Government has to do, the degree to which they can contribute by thought, action, and money to our national goals as well as to the satisfaction of their personal needs and desires. In other words, each citizen should be fully and continuously aware of his active responsibilities to the Nation and to its primary goals, in time of peace as well as war, and be prepared to make whatever sacrifices may be necessary to achieve them.

Whether our primary objective as a nation is to deter our enemies, to sustain the Free World's leadershsip, to extend a helping hand to underdeveloped nations or merely to maintain

our peace and prosperity at home, the first essential is a real determination to achieve better education, better science and technology and, above all, the development of quality in all fields—quality in training and quality in performance. Unless we can succeed in accomplishing these things we can maintain neither our national objectives nor the personal objectives of our people.

ALAN T. WATERMAN,
Director, National Science Foundation.

NATIONAL SCIENCE FOUNDATION

The Year

of the

Earth Satellites

THE STATUS OF SCIENCE

AND EDUCATION

IN THE UNITED STATES

THE YEAR OF THE EARTH SATELLITES—THE STATUS OF SCIENCE AND EDUCATION IN THE UNITED STATES

Because of the manmade satellites now circling the earth, United States citizens recognize—perhaps with more clarity than ever before—the importance of science and its contribution to their welfare and security. The achievement which brought this about was the launching of the first satellite by the Soviets in October 1957, a feat of astonishing engineering prowess. Later launchings by both the United States and the U. S. S. R. culminated a period of increasing attention in the public press to scientific and technical accomplishments, including the harnessing of nuclear energy for power as well as weapons purposes and the worldwide exploration of the universe represented by the International Geophysical Year, of which the satellites are a part.

With increased awareness of the vital role of science also came the realization of the high state of Soviet science in many fields, a fact known and reported by United States scientists for many years. To the American public, however, the first launching became a symbol of competition between Russian and American science, and a sign that we had "lost" a "scientific race." To the extent that the symbol became identified with such a "race," it was erroneous and destructive—we did not think of the undertaking in these terms, but regarded it as a part of a cooperative international scientific undertaking, the International Geophysical Year. But to the extent that the symbol called attention to certain marked deficiencies in the environment in which our scientists operate, and pointed up the need for improvements in our scientific education and strengthening of our basic research, it was accurate and useful.

Quality of the Nation's Scientific Effort

The critical self-examination that followed showed that, in point of fact, United States science has during recent years been of the highest

quality. In general, our accomplishments in research have been second to none, and United States scientists as a group have continued to rank high in the estimation of their colleagues throughout the world. It was pointed out, for example, that from 1943 to 1956, United States scientists received 34 of the 67 Nobel Prizes awarded in physics, chemistry, and medicine and physiology.

This evaluation of domestic science also showed that the Nation has not been wholly unaware of the needs of its scientists. The growing proportion of Soviet young people being trained as scientists and engineers, as contrasted with our own, had received much publicity, as had the comparatively higher position with respect both to salaries and public esteem which is enjoyed by scientists in the U. S. S. R. Expenditures for research and development have been steadily increased by industry, by the Government, and by educational and nonprofit institutions of many types, although by far the greatest percentage of these expenditures is devoted to developmental work and applications engineering, rather than basic research. Establishment of the National Science Foundation in 1950 had been a major step in the attempt to correct the imbalance in this country insofar as the position of basic research was concerned.

Public discussions following the satellite launchings brought out once again the fact that Americans customarily think of science in terms of applied work, or engineering, despite the highly significant accomplishments of research workers in the areas of fundamental investigation. Nevertheless, the connection between basic and applied research, and the degree of dependence of the latter upon the former, has become increasingly clear during the past year. In addition, the continuing reduction of the "technological lag"—the time elapsing between publication of the results of fundamental research and utilization of those results in specific engineering applications—has become more apparent.

Finally, interest in the satellites and the inquiry into the status of science which they stimulated also brought to United States citizens a realization of the interrelationships of science and scientists throughout the world. Our rate of scientific progress is appreciably increased when the achievements of foreign scientists are made available to us. Similarly, the achievements of American scientists help scientists of other countries to move on to new research, the results of which are again available to our scientists as to all others. Scientific literature is circulating more freely and more translations are becoming available. International scientific conferences are increasingly benefiting from the

participation of scientists from more and more countries, including those behind the Iron Curtain. The U. S. S. R., for example, is maintaining one of the three world data centers of the International Geophysical Year and has taken an active and cooperative part in many other IGY programs. Despite the continuing difficulty which marks political relations between the United States and the Soviet Union, scientific relationships have improved substantially. If this interchange can continue, the world may well anticipate a measurably faster rate of scientific development in the future. The economy, health, and general welfare of mankind benefit from such international exchange of scientific accomplishment.

Condition of American Education

Review of the United States position which followed the launchings also necessarily included an analysis of the educational system which must produce the well-informed and highly competent men of science and public affairs required if our Nation is to retain its position of responsibility and leadership in world affairs. Although yesterday's less exacting requirements for trained manpower were satisfied by the graduates of our schools and colleges, thoughtful observers raised serious questions about the quality of today's educational system and its ability to meet tomorrow's increasing demands for thoroughly trained men and women.

Quality in the Nation's schools was observed to be what the community and its citizens made it. So long as students disdained difficult studies in English, foreign languages, science, and mathematics; so long as they were supported by parents who derogated learning and culture with contemptuous references to eggheads and longhairs; so long as citizens were reluctant to continue to vote the increased taxes needed to provide well-equipped schools and well-paid teachers—then so long did the quality of the educational system jog along over an improvised and bumpy road. In the years immediately ahead, schools and colleges will be deluged with applicants representing the generation born in the postwar period. They will be greeted by overworked and underpaid teachers, too hard-pressed to withstand the burden of trying to maintain high scholastic standards while, at the same time, trying to satisfy the demands of an age which requires that high-ability students be provided the training to which their talents entitle them.

For the National Science Foundation, policy lines were clear—un-

equivocally, the Foundation programs were concerned with improving science education, a prerequisite for raising the quality of scientific manpower. As a result, so coveted have become Foundation fellowships for men and women pursuing science training into the doctoral area that most candidates given honorable-mention ratings have asked that their names be publicized with the announced winners of fellowships—secure in the knowledge that other sources of support would regard them more favorably because of the acknowledged severity of standards applied by the Foundation. Similarly, Foundation-supported institutes (summer, academic-year, and in-service) for high school and college teachers of science and mathematics have won nationwide acclaim for their role in improving competence in subject matter training. Finally, the Foundation's support of curriculum-improvement studies in high school physics and mathematics (with plans for similar studies in chemistry and biology) promises to point the way to measurably improved quality of course content in several fields of science, focused as these studies are on fundamental, not filigreed, science instruction.

Complementing these programs of the National Science Foundation, which made a resolute attack on the science-manpower problem, were very substantial efforts extended by several private organizations. Groups such as the Ford Foundation and the Rockefeller Foundation supported broad-based programs designed to improve education in the United States; and the National Merit Scholarship program to recognize exceptional achievement at the high school level did much to publicize the need for high intellectual attainment, through the award of college scholarships. All in all, however, these efforts were confined largely to groups already aware of the problem. At the time of the satellite launchings, citizens generally had not become genuinely concerned with the pressing problem of identifying and training prospective scientists. With Sputnik in orbit, however, the Federal Government took quick action to improve the status of science and education in the United States.

President Eisenhower Alerts the Nation

In November of 1957, President Eisenhower made two major addresses to the Nation—"Science in National Security" and "Our Future Security"—in which he focused attention on the importance of science and technology to our security and of our failure to give high enough priority to scientific education and to the place of science in our national

life. He noted, as well, our failure to give priority, both public and private, to basic research.

At the same time, the President appointed Dr. James R. Killian, Jr., President of the Massachusetts Institute of Technology, as Special Assistant to the President for Science and Technology. A staff of scientific experts was also named as the President's Science Advisory Committee to work with Dr. Killian to provide the President with the very best advice the scientific community could supply.

Soon thereafter, in recognition of the impact of science on international policy and international policy on science, Dr. Wallace R. Brode was appointed Science Adviser to the Secretary of State. Dr. Brode is directing a reinvigorated program for sending science attachés to our embassies in those countries most scientifically advanced, to collect information and to advise our ambassadors on scientific matters.

Increased Support for Science by the Federal Government

In recognition of the importance of science and the vital interest of this country in space exploration, the Congress established special standing committees—in the House of Representatives, the Committee on Science and Astronautics; and in the Senate, the Committee on Astronautic and Space Sciences. These committees will permit far more effective congressional consideration of the increasing number of problems in these areas.

Actions taken by the Federal Government through the executive and legislative branches to improve our scientific position include:

1. *Increased Research Appropriations.*—Increased funds for research were given to the National Science Foundation for its basic research programs, to the Public Health Service for its programs of medical research, to the Atomic Energy Commission for its programs in atomic research, and to the Department of Defense.

2. *Establishment of a Space Agency.*—A major legislative achievement was the creation of an independent Federal agency to direct aeronautical and space research and activities, including the development and use of aeronautical and space vehicles. This agency has been designated as the National Aeronautics and Space Administration. Space activities will be coordinated and policy set at the highest level by the Aeronautics and Space Council composed of the President, the Secretaries of State and Defense, the Administrator of the NASA, the

Chairman of the Atomic Energy Commission, and a maximum of one additional Government and three additional non-Government members.

Noteworthy as well is House Concurrent Resolution 332, expressing the sense of Congress that the United States should strive for international agreements banning the use of outer space for military purposes and providing for joint exploration of outer space and the amicable settlement of international disputes arising therefrom.

3. *Improved Working Conditions for Government Scientific Programs.*—Strengthening the Federal Government's own research effort was another considerable achievement. Physical scientists and engineers employed by the Government were given salary increases. Recruitment for junior scientific and technical positions was authorized at a higher salary level. Scientific and engineering personnel were made eligible to receive further training and education at Government expense. Newly appointed scientists and engineers traveling to their first post of duty now receive travel expenses not heretofore granted.

4. *High-level Coordination of Research and Engineering Activities in the Department of Defense.*—The position of Director of Research and Engineering was established within the Department of Defense, with rank above the Assistant Secretaries of Defense and power to manage projects of interservice character without the necessity of following the military chain of command of any of the services. Furthermore, the Department of Defense issued a significant directive stressing the importance of basic research.

5. *Other Legislative Actions.*—(a) The National Science Foundation was directed to begin a program of study, research, and evaluation in the field of weather modification; (b) Federal agencies were authorized to use certain foreign funds, acquired by this country in connection with agriculture surplus programs, for scientific activities overseas including collection and translation of foreign science literature; and (c) authorization to make grants, as well as contracts, was provided for Federal agencies engaged in contracting for basic research by educational and other nonprofit institutions. These agencies were also enabled to vest, with the institution, title to equipment procured from research funds.

Federal Activity in the Field of Education

1. *President's Special Education Message to the Congress.*—In January 1958, President Eisenhower forwarded to Congress a special educa-

tion message containing recommendations for "certain emergency Federal actions to encourage and assist greater effort in specific areas of national concern." He said, "Because of the growing importance of science and technology, we must necessarily give special—but by no means exclusive—attention to education in science and engineering."

He recommended a fivefold increase in the appropriation for the scientific education activities of the National Science Foundation because they are regarded "as among the most significant contributions currently being made to the improvement of science education in the United States."

Also submitted were recommendations for additional temporary Federal programs to strengthen general education and to strengthen science education in our State and local school systems. These programs were to be conducted by the Department of Health, Education, and Welfare.

2. *Congressional Response.*—Probably the first action taken to improve existing conditions was the early passage of a supplemental appropriation to the National Science Foundation of approximately $9 million permitting immediate expansion of existing programs designed to improve science education. This included the award of additional fellowships and attendance of additional high school science teachers at summer institutes.

The 1959 appropriation for National Science Foundation educational programs was increased more than 300 percent to approximately $60 million, thus allowing wide expansion of existing programs and the initiation of new programs.

However, the principal congressional action in the field of education was the National Defense Education Act of 1958, which constituted the first general Federal aid-to-education legislation since the Morrell Act of 1862. At the same time the act reaffirmed the principle that State and local communities have primary educational responsibility including that for supporting science and language study and for encouraging high academic standards as being in the national interest.

This act provided, among other things, for loans to students to enable them to attend college; for the award of graduate fellowships; for matching grants to the States for guidance and counseling activities in the high school and for vocational programs for training highly skilled technicians requiring scientific knowledge; and for contracts with colleges for conducting foreign language institutes for elementary and secondary schoolteachers. Major administrative responsibility for

carrying out the provisions of this statute was assigned to the Department of Health, Education, and Welfare.

The act also created a Science Information Service in the National Science Foundation to develop new and improved methods for making scientific information more readily available, thus endorsing a recommendation of the President's Science Advisory Committee. In this way, Congress emphasized the importance of the information programs presently being carried on by the Foundation pursuant to the 1950 act establishing the Foundation.

Recommendations of the Scientific Community

In March of 1958, the American Association for the Advancement of Science convened a Parliament of Science of more than 100 prominent scientists and public leaders. One of their key conclusions was that Government support of scientific research should not be centralized in a single Department of Science.

Among their other conclusions were:

1. Optimal progress in science requires increased support for basic research.

2. As funds for support of science increase, plans and procedures for administering the national scientific effort become increasingly important and national scientific policy bears closer scrutiny.

3. Scientists must have maximum freedom to communicate with each other and with the public in order that science may progress most effectively and may be most widely used for improving human welfare.

4. As citizens, scientists must ponder the social consequences of their findings and must inform the public of the consequences they foresee.

5. The primary goal of education is the intellectual development of the individual.

What Remains To Be Done

In his Oklahoma address of November 14, 1957, on "Our Future Security," President Eisenhower not only stressed the importance of insuring high-quality instruction in science and engineering and the early identification and encouragement of science and engineering students, but he also emphasized the "long-term concern for even greater concentration on basic research—the kind that unlocks the secrets of

nature and prepares the way for such great breakthroughs as atomic fission, electronics, and antibiotics."

While pointing out the fact that "at present our basic research, compared with any other country's, is considerably greater in quantity and certainly equal in quality," he warned of the "fast rate of increase of the Soviet effort and their obvious determination to concentrate heavily on basic research. The world will witness future discoveries even more startling than that of nuclear fission. The question is: Will we be the ones to make them?"

Basic Research—A National Resource

One month before the President's Oklahoma address, the Director of the National Science Foundation, on October 15, 1957, transmitted to the President the report of the Foundation, *Basic Research—A National Resource*. In his letter of transmittal, the Director said:

> The report will, I believe, be informative and should prove helpful toward bringing about a fuller understanding concerning the desirable balance between applications of science to defense, health, and the economy on the one hand, and basic research activity—the "defense in depth" for our whole technology—on the other.

This report contained recommendations designed to improve the status of fundamental research in the United States—recommendations of far-reaching nature which warrant reemphasis here. Briefly, they are:

1. Government agencies should significantly increase the support of basic research (including facilities) and of training for research, as well as ensuring that support is rendered on a continuing stable basis.
2. State Governments, with Federal assistance, should increase their support of basic research and of graduate education at State universities.
3. Federal grants and contracts for research and research training should continue to carry a minimum of restrictions on the freedom of the scientist and of his institution.
4. Methods should be devised for increasing philanthropic gifts for basic research, with no restrictions as to their use.
5. Industry should be encouraged to conduct more basic research in its own laboratories.
6. Scientists working for industry should be encouraged, both by their firms and by scientific journals, to publish their research.
7. Closer and better relationships should be developed between mem-

bers of Congress and scientists, in view of their respective responsibilities to each other and to the American people.

Implicit in these recommendations is the strongly held conviction of the scientific community and of the National Science Foundation that the Federal Government must not exercise centralized control over science. Increased Federal support does not carry with it the license to direct the research, or to set the policies, scientific or otherwise, of the institutions receiving support. Each needs the other, but they must remain separate. Otherwise, our research institutions and our scientists might well begin to feel an erosion of the intellectual freedom which is their bulwark and our shield. For the educational and sociological barriers which are today set in the way of science, we cannot substitute legislative and administrative chains because, as we are finding out, limitations upon our scientists are limitations upon all of us.

It is important to understand the reasons for this policy. The first is that intellectual freedom is a cardinal principle of democracy. The second, related to and underlying the first, is that intellectual freedom constitutes the great strength of a true democracy. Creativeness, originality, and accomplishment are at a maximum when left to individual initiative and enthusiasm.

The goal of our scientific effort and indeed all our efforts must be quality—quality in native ability, quality in training, and quality in performance.

Quality in native ability we have in abundance, latent among our youth, from all walks of life. But we must identify these young people early, give them every encouragement and opportunity to develop their aptitudes to the fullest, whatever these may be, for their own future and for the future of our society.

Quality in training for these young people we must insist upon. This means superior teaching and superior teachers, together with the equipment and materials they should have.

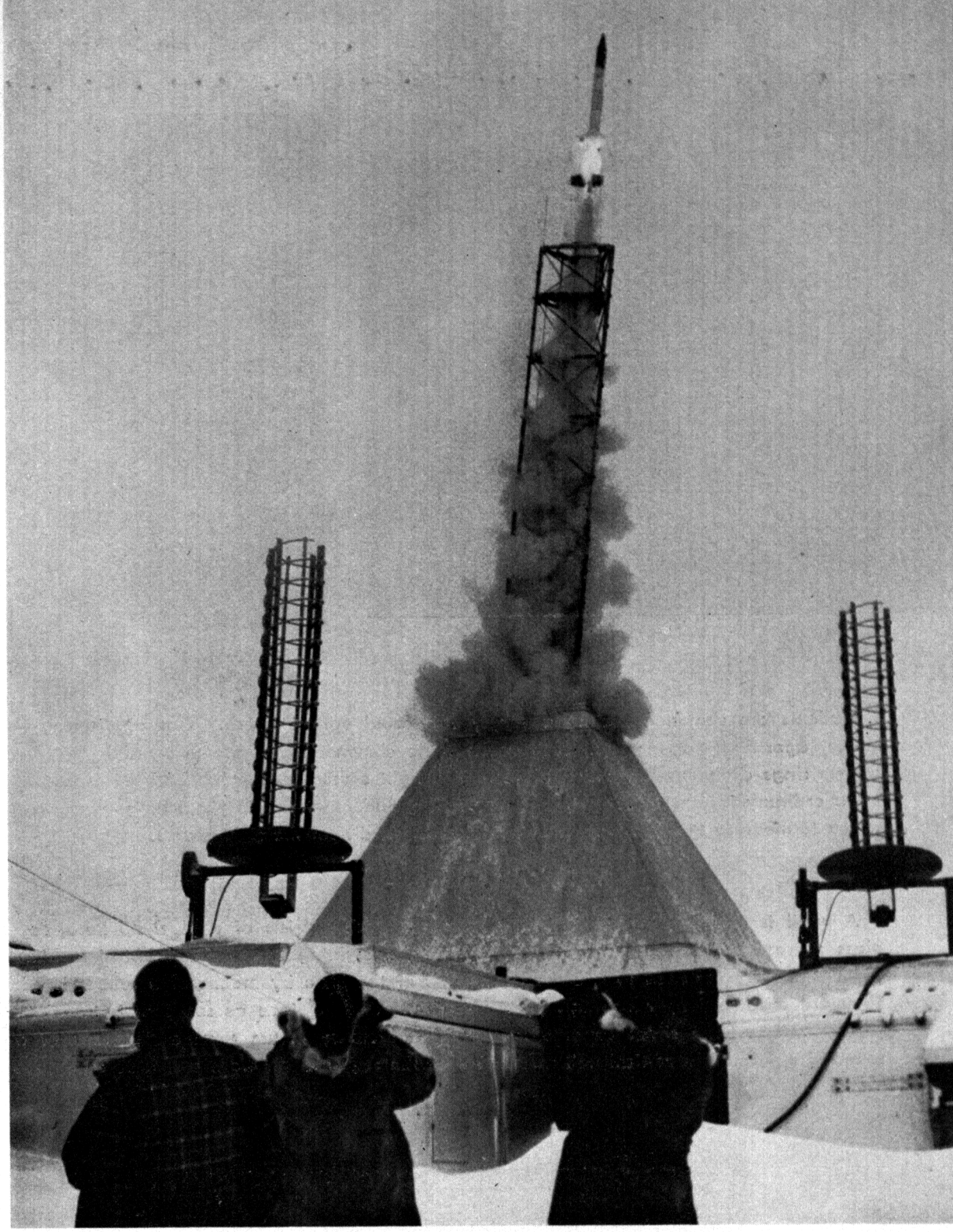
Quality in performance in science and technology requires that we push forward the frontiers of science with all the vigor at our command. This means full support, both financial and moral, to our competent basic research scientists and engineers for their needs. This includes the construction of essential though costly capital installations, such as those required for nuclear physics, astronomy, oceanography, and the exploration of outer space.

The role of the Federal Government then is to encourage and assist efforts such as these. There is a final ingredient, however, without which effective results cannot be achieved, namely an understanding

and a determination on the part of our people to achieve them, and a pride in intellectual, as well as material accomplishment. When all is said and done, in the modern competitive world as in the past, it is the determination and perseverance of a people toward its national goals and toward international cooperation which alone can bring about realization of the hopes of mankind.

NATIONAL SCIENCE FOUNDATION

A Photographic Sampling of Foundation-Supported Activities



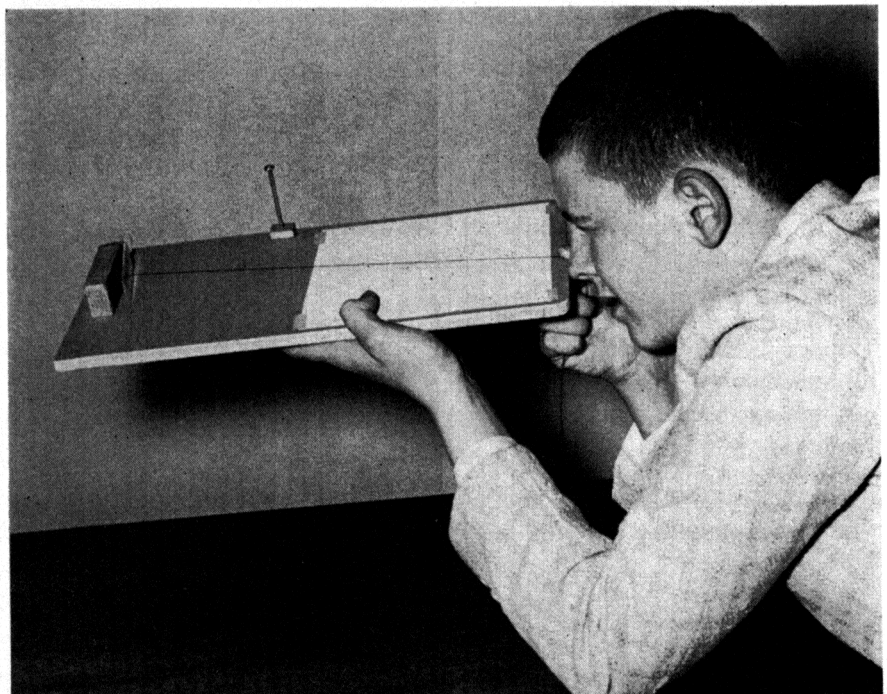
UPPER ATMOSPHERE RESEARCH

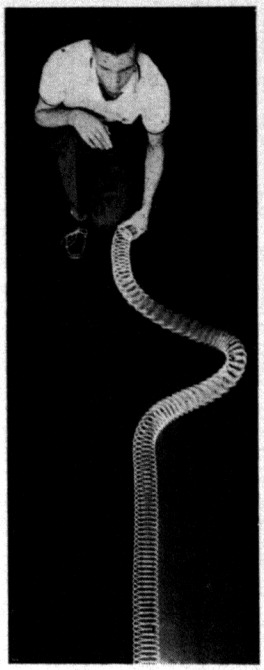
An Aerobee-Hi liquid-fuel research rocket is shown being fired at the IGY rocket-launching site; Fort Churchill, Manitoba, Canada. It carries an instrument payload of 150 pounds in a 4 to 6 cubic foot space to altitudes of 150 miles. The launching platform is set indoors because of the extreme cold during the winter months. The launching tower can be tilted to counteract the effect of winds. Antennas, on each side of launching stand, are used in tracking rocket in flight.

This is part of the United States program for the International Geophysical Year conducted through the U. S. National Committee with Federal coordination being provided by the National Science Foundation.

Students are shown operating a simply fabricated optical bench. Optical elements—lenses, apertures, screens, etc., such as on table shown above—are mounted in wooden curtain rings clamped to wooden blocks. The light source, at the left end of the bench, is an ordinary incandescent bulb in a can. The student at left is positioning an opaque screen to measure the focal length of a lens positioned near the light source.

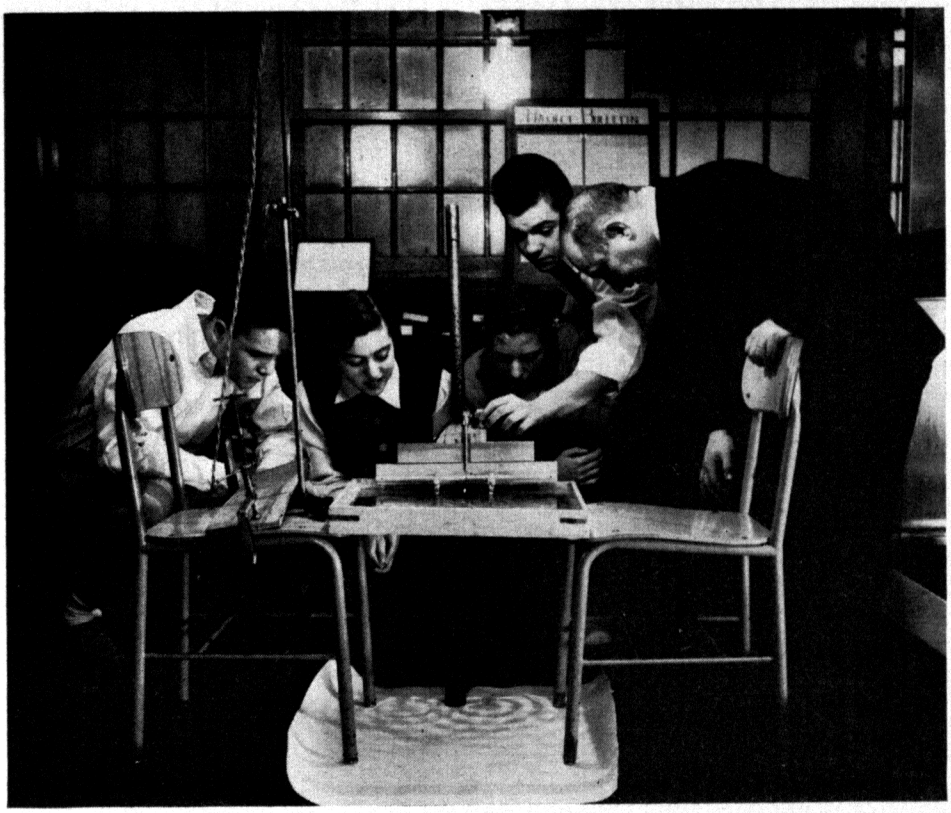
A pupil is shown using an optical micrometer which consists of a plywood base, two glass microscope slides, a reference object, and a sighting thread for calibration. The glass slides are fastened to a block at the left of the base by means of a rubber band. They are separated near one end by a pivotal needle. Objects as small as human hair placed between the slides cause a measurable difference in the apparent position of a reflected object. The vertical nail mounted near the center of the base serves as an object.



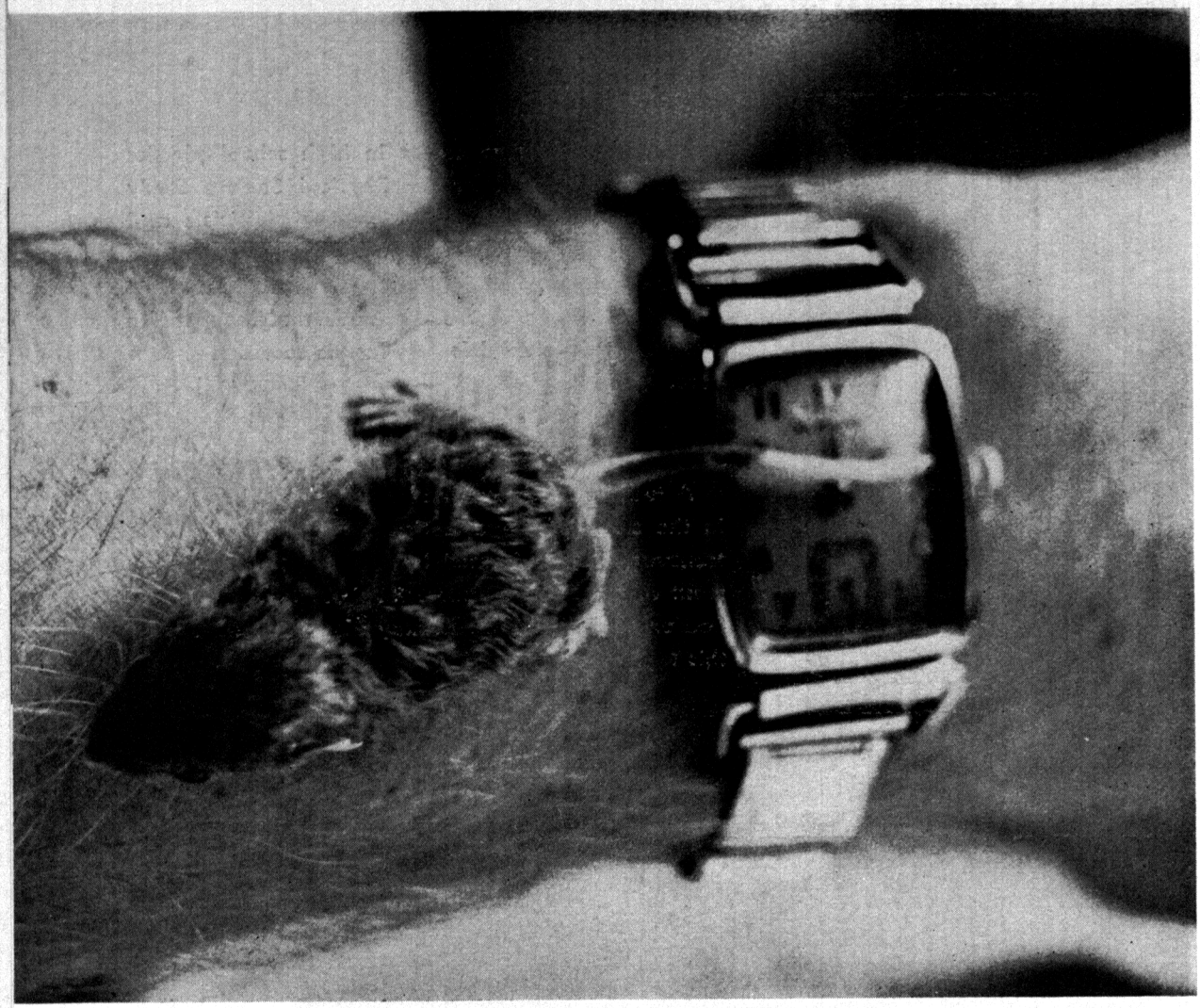


A completely new course in high school physics has been prepared by the Physical Science Study Committee composed of outstanding physicists and experienced successful high school teachers with support from the National Science Foundation. (See page 65.) Some of the ingenious and inexpensive equipment developed for use in this course is shown here.

A teacher holds one end of a "slinky" toy used in the study of wave motion. The photo shows a transverse wave formed by a quick lateral movement of the spring. Interesting effects of wave reflection and superposition may also be studied with this toy.

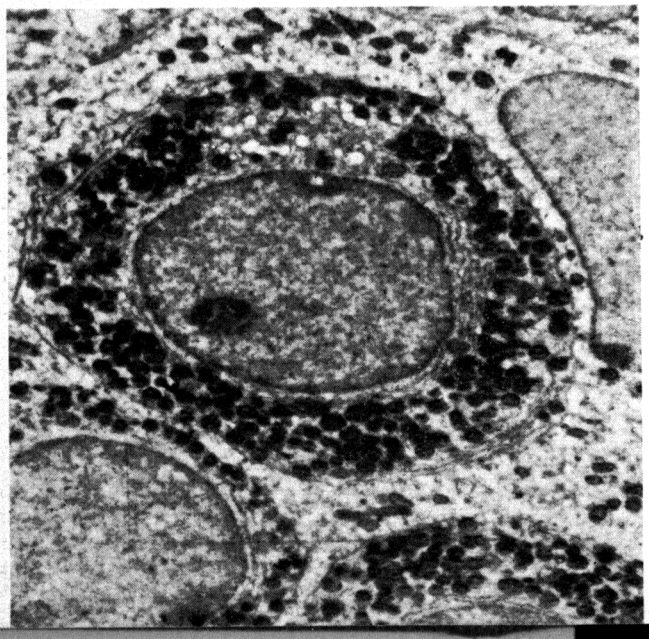


High school students using a ripple tank fashioned from readily available materials. The tank consists of a glassed-in window frame, balanced on two chairs, containing a half inch of water. The rippler is a vibrating wooden plane assembled from scraps of lumber, and powered by a six-volt hobby motor. In operation, the light source at top center, formed from an ordinary bulb in a modified tin can, projects the ripple pattern on a paper screen on the floor.



DWARF MOUSE PROVIDES CLUE TO NATURE OF GROWTH HORMONE PRODUCTION

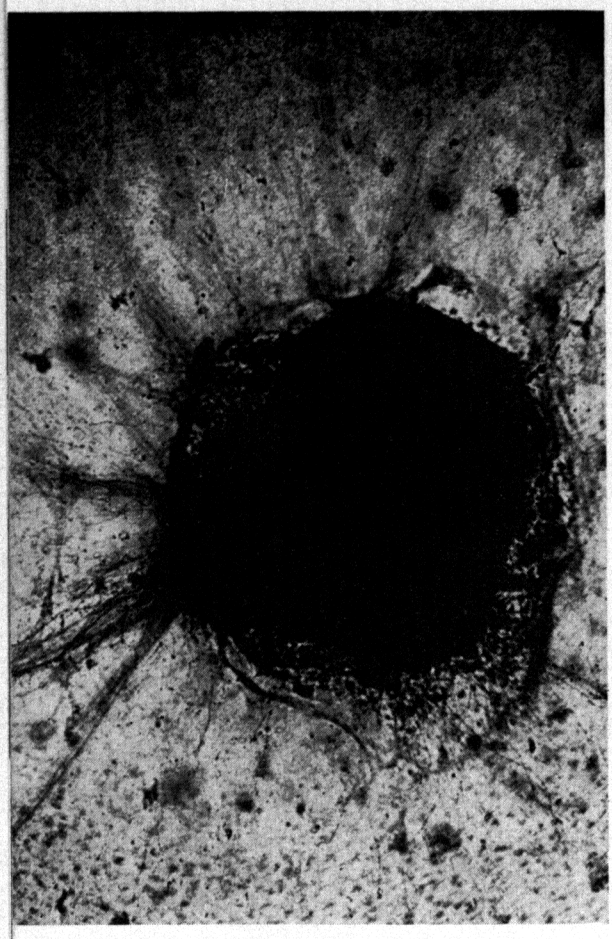
Comparison of dwarf mice—mice of normal size and appearance at birth which fail to grow—with normal mice has provided evidence that the absence of cellular granules is linked with the demonstrated absence of growth hormone produced in the anterior pituitary gland. Electron micrographs, enlarged 10,000 times, of this gland in a 21-day-old drawf mouse (lower left) shows the absence of large granules and the reduction of amount of cytoplasm of the dark cells (probably remnants of the acidophiles). A micrograph of the same part of the pituitary gland in a 21-day normal mouse shows the large granules surrounding the nucleus (lower right).

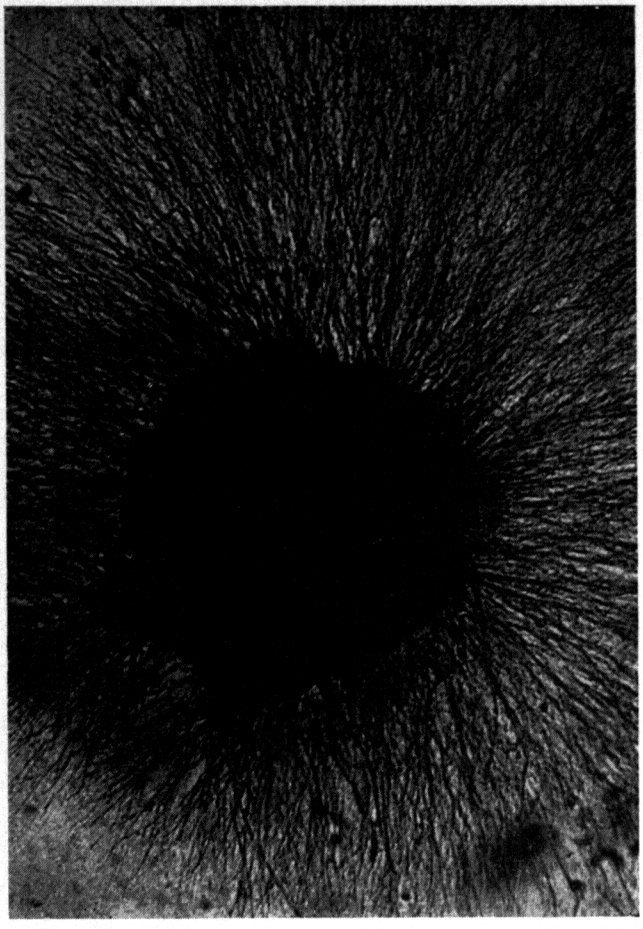


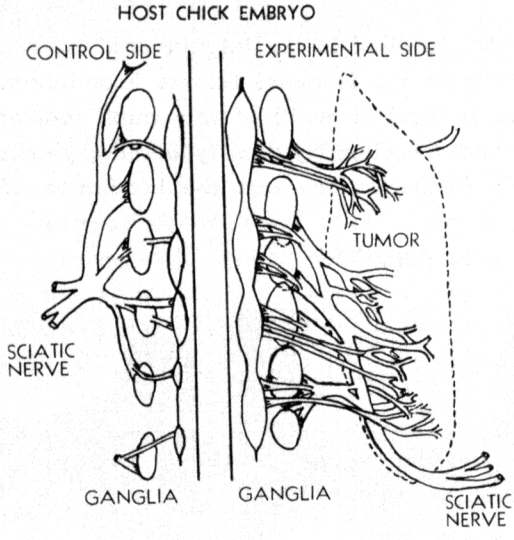
NUCLEAR REACTOR—ONE OF MOST POPULAR U. S. SCIENTIFIC EXHIBITS AT THE 1958 BRUSSELS WORLD'S FAIR

The nuclear reactor was one of 51 U. S. exhibits installed in the International Science Section of the Fair, through the coordination efforts of the National Science Foundation. The built-in safety factors and low operating power level (1 watt) of this small reactor permitted actual operation at the Fair. It is a modified swimming pool type using plastic embedded U^{235} enriched fuel. Among the public demonstrations was the irradiation of silver coins to produce harmless radioisotopes.

Other exhibits can be seen in the background. (See page 77.)

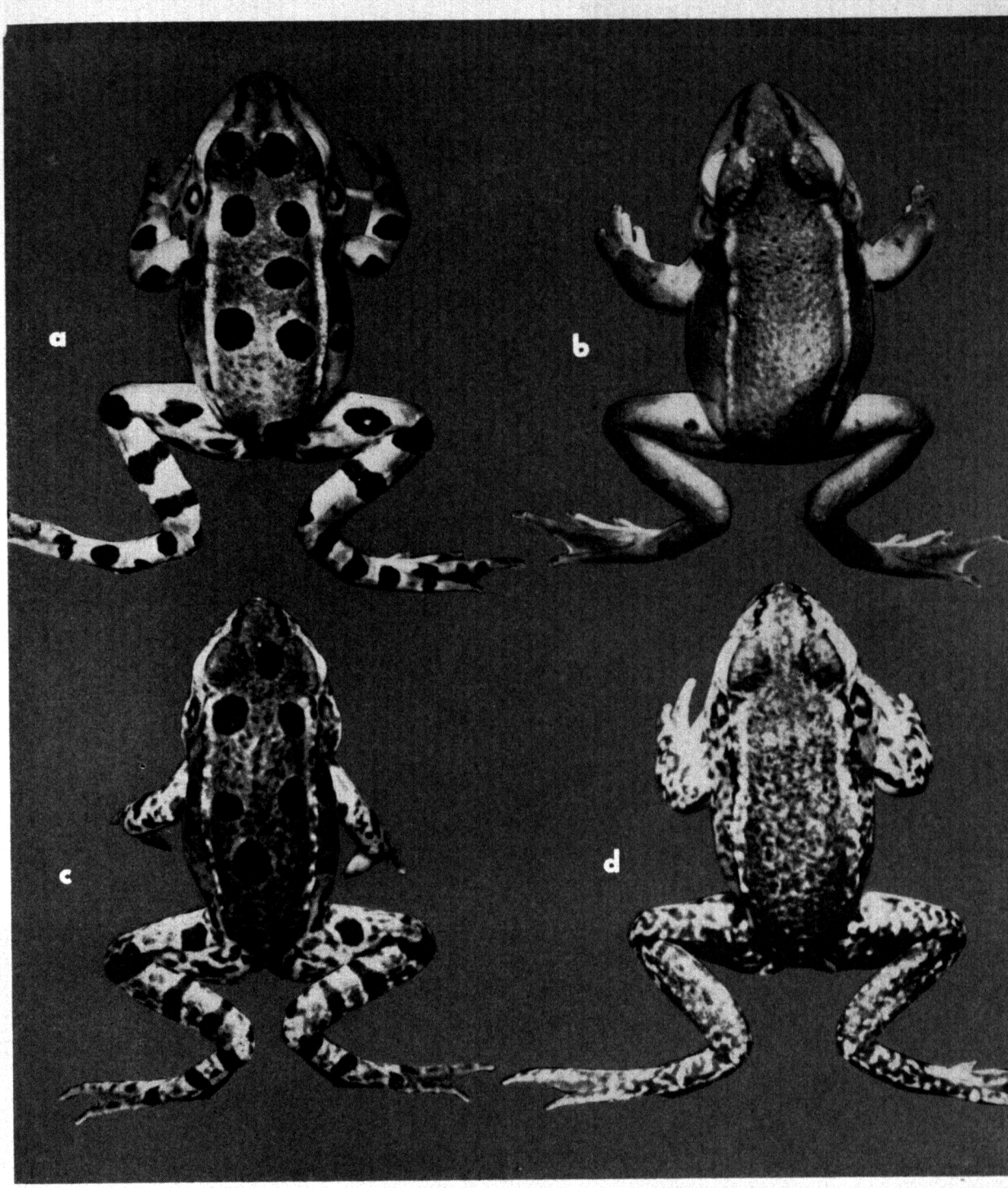






NERVE GROWTH STIMULATED BY AGENT FROM SARCOMA (A TYPE OF CANCER NOT INVOLVING NERVE TISSUE)

The influence of a diffusible agent from a mouse tumor, transplanted into a chick embryo, on the size of the ganglia and the number of nerves growing from them, can be seen from the sketch. The photo on the left shows the normal growth of a ganglion of a 10-day chick embryo as grown in tissue culture; the photo on the right shows the growth and proliferation of the nerve fibers of the ganglion 24 hours after a single drop of the mouse tumor agent was added. **(See page 31.)**

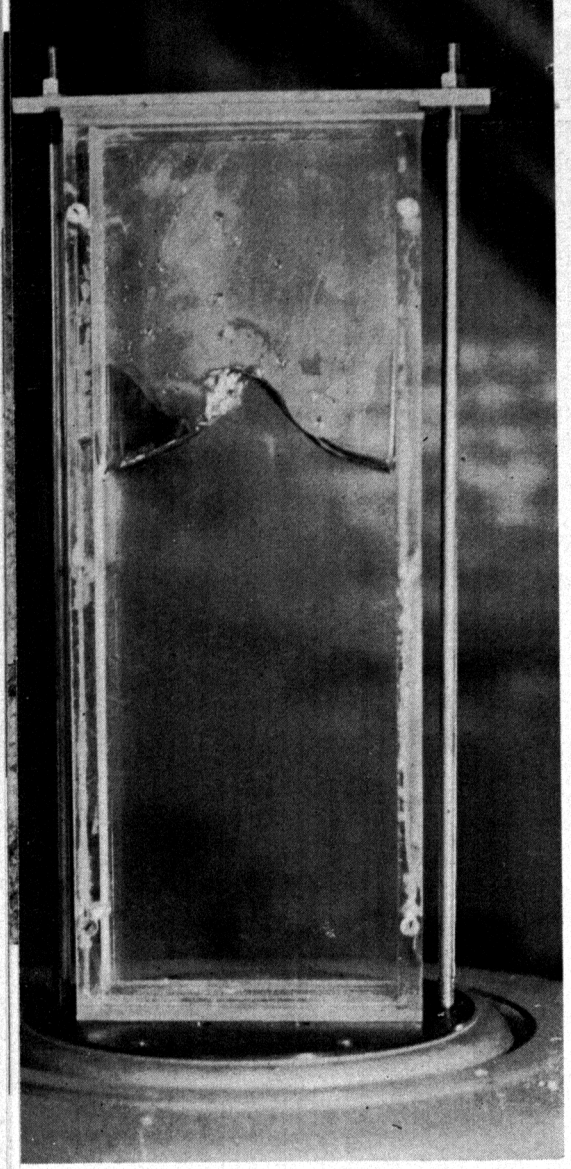


GENETIC STUDIES AID IN REVISING TAXONOMIC CLASSIFICATION

Three obviously related types of frogs belonging to the Genus Rana (see (a), (b), (c) on photograph) have been classified as different species on the basis of their pigmentation differences. Genetic studies, however, have revealed that two of these so-called species—Burnsi (nonspotted) and Kandyoshi (mottled)—(b) and (c), are dominant mutant variants of the common spotted leopard frog (a).

A fourth variant (d), which is not found in nature, was produced by crossing the nonspotted and mottled varieties. Since the nonspotted and mottled types are known to coexist the failure to find this particular cross in nature may indicate that it is at a selective disadvantage.

The other three forms are obviously successful or else they would not be so prevalent.



LIQUID BEHAVIOR STUDIED UNDER WIDELY VARYING CONDITIONS

Two projects carried on under Foundation grants serve to illustrate the wide range of studies of liquid behavior. The top photograph shows the primary stage of a surface wave just preparatory to bubble formation, in a liquid under vibration. This study explored the characteristics of bubbles in various types of liquids and under varying vibration conditions. The lower photograph illustrates research into the energy of two-dimensional water waves, through the use of a model tank which can generate both water waves and winds above the waves. The wave-absorbing ability of various arrangements of vertical walls was examined in this study.

Program Activities

of the

National Science Foundation

SUPPORT OF BASIC RESEARCH IN THE SCIENCES

Research Programs

Foundation programs in support of basic research are conducted through the Division of Biological and Medical Sciences; the Division of Mathematical, Physical, and Engineering Sciences; and the Social Science Research Program. Research projects described here are to be considered illustrative of the research being supported. Facilities support included under these programs has been limited to specialized research facilities, where the need was urgent, was clearly in the national interest, and the necessary funds were not available from other sources.

DIVISION OF BIOLOGICAL AND MEDICAL SCIENCES

Current Research Support

In the area of *Developmental Biology,* a wide variety of research was supported, covering chemical embryology (metabolism of embryos), plant growth (hormonal control), plant morphogenesis (shoot or root apex activity, floral induction, slime mold development), chloroplast differentiation, physiology of reproduction (ovarian, uterine, and placental physiology), regeneration (wound-healing), skin and tumor grafting, histology, histochemistry, anatomy, embryology (plant and animal), and cytology (mechanisms of mitosis). Specifically, studies are being supported on the sequence of the events which operate in limb formation in mammalian organisms by such techniques as tissue transplantation and interchange of organism parts; nucleic acid metabolism and the changes which occur in it during early development of the mammalian embryo; the mechanisms of cellular interactions, particularly their biochemical and biophysical aspects; the origin and fate of special initiator-cell members of cell populations; and microscopic structure and histochemistry of the fine structure of the skin in primates.

As in previous years, the *Environmental Biology* program supported a wide variety of projects including various aspects of animal and plant ecology, both terrestrial and aquatic life histories, environmental physiology, paleoecology, certain phases of parasitology, and other areas of

biology in which the major immediate emphasis is on the interrelationships between the external physical, biological, or sociological factors and one or more organisms. Although much of American research activity in environmental biology continues to be descriptive and devoted to observations of gross physical habitat and organism survival relationships, the program has emphasized studies analyzing functional aspects of the interaction, exchanges, and adjustments of the members of the plant and/or animal community and of their physical and biological environments. Interest in population dynamics in its many aspects, including cyclic phenomena, continued to be an expanding interest.

Within the *Genetic Biology* program, studies in the area of microbial genetics included work aimed at determining the mechanisms by which enzymes involved in biochemical syntheses are controlled genetically. Studies also were supported on gene-enzyme interrelationships, pointed toward enhancing our understanding of the interactions between gene and enzyme. Research on the genetics of higher plants included work on mutations in maize, as well as work on cotton and tobacco. Significant research relating to the theoretical aspects of quantitative genetics also was supported.

Some of the outstanding research supported during the last fiscal year by the *Metabolic Biology* program covered the following areas: the problem of enzyme-inhibitor relationships responsible for cellular metabolic activity; elucidation of the enzymatic mechanisms occurring in fat metabolism of higher plants; and the investigation of certain aspects of protein biosynthesis. Other exciting projects supported included a study of the function of nucleic acids in growth, differentiation and induced enzyme formation, and an investigation of the basic mechanisms of mammalian carbohydrate metabolism.

With the advent of the program covering metabolic processes, the *Molecular Biology* program was redefined to encompass studies of the physical and chemical properties of substances of biological origin; studies of individual enzymes such as isolation, purification, properties, kinetics, and mechanism of action; and such aspects of physical biology as fine structure, membrane phenomena, and chemical and physical properties of particulates. This year's grants have been concentrated in the areas of protein structure, enzyme kinetics, bioenergetics, membrane phenomena, and photobiology, with somewhat less emphasis on biogenesis, immunochemistry, and biochemical cytology.

With respect to the substance of the *Psychobiology* program, research covering the underlying neurological foundations and neurochemical aspects of behavior continued to be supported. The traditional interest of the program in relating newly developed quantitative techniques to

experimental problems in psychology was also continued through support of work on the development of psychological measurement models, and on the use of multivariate methods in psychological research. In a somewhat related area, the impact of computer techniques on research in the field of psychology is illustrated by a grant aimed at developing computer techniques for handling data from the area of learning research.

The program in *Regulatory Biology* supported outstanding research in such conventional fields as neurophysiology and endocrinology. However, exciting research in less traditional areas is illustrated by projects involved in the study of chemical processes that give rise to biological rhythms. The program also encompassed investigations of the development of regulatory processes in fetal and newborn organisms, in the chemical senses of insects, and other regulatory processes of organisms.

The areas of research in *Systematic Biology* is on essentially three levels of complexity. At the first level, the units of organic diversity are discovered, identified, characterized, and named. At the second level, the major task is classification—the arrangement of the otherwise chaotic mass of species into the so-called higher categories. At the third level, systematic biology is the study of the interrelationships of organisms in space and in time. During fiscal year 1958 grants were made to aid research on each of these levels. An illustration of the type of discovery and inventory-taking that occupies taxonomists in lesser known parts of the world is a study of the flora of the Lesser Antilles. Similar studies of the life of a different geological period cover research on the Triassic vertebrates of Argentina. The application of comparatively new techniques to problems of classification is demonstrated by research on the fine structure of pollen grains, on paper electrophoresis as a method in avian taxonomy, and on serological studies of the grass family. At the third level of complexity in the systematic area, valuable summarizing research is under way on the zoogeography and evolution of Pacific insects, on the speciation of amphibian populations, and on the Drosophilidae of the Caribbean region.

Significant Research Developments

WAX-EATING BIRDS PROVIDE CLUE FOR CONTROL OF TUBERCULOSIS.—The honey guide, a small family of bird found primarily in Africa, presents an interesting problem in animal behavior in its symbiotic (mutually beneficial) relationship with certain mammals, including human beings. Specifically, these birds guide the mammal to the vicinity of wild bees' nests and, following the foraging of such nests by

the mammal, feed avidly on the waxy comb, which constitutes their chief source of food. In the course of investigations on this behavior and on the unique problems of digestion and nutrition involved, a hitherto unidentified wax-splitting bacterium was isolated from the intestinal tract of the bird. Although this organism, *Micrococcus cerolyticus,* cannot by itself degrade wax *in vitro,* rapid breakdown of wax occurs if a mixture of ground liver, intestine, and spleen of chicks is added to the culture. Conversely, chicks, while themselves unable to digest wax, metabolize this substance effectively if it is mixed with a culture of the micrococcus.

Of particular interest is the apparent "interference" effect between the micrococcus and the tubercule bacillus, whose envelope is "waxy" or lipoidal in nature. As a result of recent studies in this connection, a protein fraction isolated from the micrococcus has been found to inhibit the growth of the tubercule bacillus in tissue culture. This apparently is a result of inhibition of the oxygen uptake of resting cells or of cell-free extracts of the bacillus. In preliminary experiments, it has been found that this protein fraction also appears to protect guinea pigs against tubercule bacillus, presumably by inhibiting the development of the infecting organisms.

This investigation may not only provide an explanation of the basic mechanisms of "interference" between two microbial species and of wax digestion but also suggests important implications in the therapy and control of tuberculosis. Moreover, this work vividly illustrates how information in one area of biological sciences may lead directly to important observations in another, superficially quite unrelated area.

BASIC GENETIC AXIOM REGARDING INDIVIDUALITY OF GENES UNDER QUESTION.—A firm belief in the individuality of genes underlies all research in modern genetics. By "individuality" is meant that a given gene will not be modified or changed in any way by external influences, except for the well-known agents, such as X-rays, which cause mutation. Although the *expression* of a gene can readily be affected in all kinds of ways, the basic nature of a gene is presumed to remain constant and unchanged, generation after generation, until such time as, by chance, it suffers a mutation. Then the new mutant form of the gene again persists almost indefinitely until such time as another mutational event may occur to produce still another mutant form of the gene.

The first case on record which clearly violates this basic axiom about the individuality of genes has been discovered. A gene in corn—one that produces color in the kernel—can be permanently modified simply by bringing it into combination with a particular one of its alleles

(partner genes). When the color gene is later removed by outcrossing from the "contaminating" influence of its partner, it is found to be no longer capable of producing normal seed pigment. Further, this loss of potency is permanent; the color gene has been mutationally changed. Thus, it is now possible to modify at will a particular gene merely by making a cross of two different kinds of corn plants.

Should this phenomenon be found to occur generally, an entirely new mechanism will have to be taken into account in explaining the origin of genetic variability, which itself underlies all evolutionary change. This discovery may well turn out to be among the most significant basic discoveries in genetics. In any event, the "individuality of genes" will never be the same again.

PLANTS SHARE ROOT SYSTEMS.—In nature, the roots of plants of many species or of individuals of the same species frequently grow together in a tangled mass. It has also been reported that natural root grafts may form between one plant and another, but the significance of this botanical curiosity is poorly understood. Grafts were revealed by examining roots of trees exposed by windfalls, excavation of roots, or by detection in a tree of substances (isotopes, dyes, poisons, etc.) injected into another tree. Injection of these substances into root systems through stumps of felled trees proved to be the most effective method of determining the transfer of material between trees, and therefore the presence of a true root graft.

It was discovered that more than half of the trees in one test plot were grafted to one or more of the neighboring trees. In another test plot not only were most of the root systems grafted together, but this method revealed that many of the seemingly dead smaller trees had living root systems which had been captured by the large trees.

These findings may bring into question one of the basic assumptions of plant ecology, namely, that most plants operate as individual entities in competition with other individual entities. These results suggest that some plants may operate as a well-knit group or unit having a common physiology. The concept of group operation could be of importance in understanding the dynamics of vegetation development.

NONNERVE TISSUE TUMOR AGENTS SPECIFICALLY INDUCE NERVE GROWTH.—Certain cancerous tissues (sarcomas) of mice contain a diffusible agent which strikingly promotes the outgrowth of nerve fibers from spinal and sympathetic ganglia (groups of nerve cells along the spinal cord) in the chick embryo to which these sarcomas have been grafted. The tumor agent is specific in that it does not stimulate the

growth of any cells other than those in the spinal and sympathetic ganglia. More recently it has been found that nerve growth factors, similar to the tumor factors, are present in the salivary glands of the mouse and rat, in snake venoms, and in the venom of the Gila monster. Both the sarcoma and venom factors are proteins which obtain their effects by stimulating the protein-synthesizing machinery of the nerve cell. As one of several examples of the influence of diffusible protein growth-promoting substances upon cell behavior, these studies advance our understanding of the control of pathological and normal growth in animals, including man.

MECHANISM OF INFORMATION-EXCHANGE BETWEEN CELLS PROBED.—Understanding the process of development of multicellular organisms from the original single cell, the fertilized egg, requires knowledge of the control mechanism by which cells interact (exchange information) to promote orderly growth and differentiation.

A most promising technique for studying this phenomenon has been that of interposing barriers, such as filters and membranes, between interacting cellular groups. Results so far obtained show that direct surface contact between cells is not necessary for the transmission of information from one cell to another (in the form of special information-bearing molecules). There are indications that the chemical transfer of information occurs via cytoplasmic bridges connecting the cells and low macro-molecular bridges of the matrices which surround the cells.

SEX HORMONES CONTROL PLANT GROWTH.—Sex hormones not only control sex organ formation and sexual behavior in animals and the higher plants but have been recently discovered to play a similar role in the more primitive plants (water molds and ferns). In the water molds the sexual process is composed of a number of distinct reactions which occur alternately in the male and in the female, and each reaction is directly dependent both for its initiation and regulation upon a hormone(s) produced by the plant during the last preceding stage. Particularly interesting is the isolation and chemical characterization of a specific male sex organ-inducing agent secreted by the sex cell-producing stage (prothallium) of the common bracken (fern). This agent, at a concentration of one part in 30,000, is able to transform almost half of the cells of the test fern prothallium into male sex organ-producing cells, whereas no male sex organs develop in the untreated controls. The agent which is organ specific, but not species specific, has been identified as an unsaturated aliphatic acid with a molecular weight of about 500.

PROTEIN-LIKE MATERIALS SYNTHESIZED DIRECTLY FROM AMINO ACIDS.—Proteinoids (protein-like material) have been produced by the application of heat (170° C.) to mixtures of amino acids. By the use of two acids—aspartic and glutamic—in excess quantities, it has been possible by adding various mixtures of the 18 amino acids which occur in natural proteins to produce substances with characteristics of proteins. The amino acids polymerize in a specific nonrandom order. By the proper selection of these amino acids, it is possible to synthesize proteinoids which contain desired pharmacological properties, etc.

The sequence of reactions and products formed through thermal action on amino acids to produce proteinoids gives strength to one of the hypotheses of biogenesis—namely, that complex biological molecules originally came into existence in the presence of moderately high temperatures, possibly resulting from the intrusion of hot volcanic magma into marine waters or by the inundation of heated tidal pools.

THE ALTERATION OF PROTEINS AT WILL.—The discovery of a method for introducing sulfur in the form of sulfhydryl (-SH) groups and disulfide (-SS-) groups into proteins and protein-like molecules has made it possible to alter at will the physical, chemical, and physiological characteristics of proteins. This development not only provides an excellent tool for probing the structure of the protein molecule, but also permits tailoring of proteins with desired medical and industrial characteristics.

The reagent used is N-acetylhomocysteine thiolactone with silver as a catalyst. The number of -SH groups introduced is controlled by varying the concentration of silver. These -SH groups are incorporated into the protein molecule through displacement of amino groups ($-NH_2$).

A nonmelting gelatin which has promise as photographic emulsion, and a nonsolidifying gelatin which might be used as a plasma extender have been prepared. Similarly a protein fraction with which antibiotics, mercurial diuretics, etc., may be conjugated to extend the life and potency of these agents has been postulated. The use of this process on aminated cotton has produced a product with a number of wool-like characteristics. (-SS- groups are the chief crosslinks in wool fabrics, but are absent in natural cotton.) This thiolated cotton is highly efficient for removing heavy metals from solution and is an insoluble oxidizing and reducing agent (electron exchanger).

THE TRANSPORT OF PROTEINS ACROSS THE INTESTINAL BARRIER.—During the digestive process enzymes, such as trypsin, break down pro-

teins into their constituent amino acids which are then absorbed into the circulatory system through the intestinal lining.

By feeding a trypsin inhibitor in conjunction with a protein, such as insulin, intact protein molecules can be transported across the intestinal barrier into the blood without previous breakdown.

These experiments may well explain the manner in which antibodies in colostrum (the early milk from mothers) are transmitted to the infant. This research also indicates a strong possibility that, through the use of digestive enzyme inhibitors, essential protein-like molecules may be introduced into the circulatory system by oral administration rather than through commonly used injection techniques.

BASIC HEREDITARY AND VIRUS MATERIAL SYNTHESIZED ENZYMATICALLY.—By adding an enzyme obtained from bacteria (DNAase) to a previously prepared mixture of nucleic acids, it has been possible to synthesize deoxyribonucleic acid (DNA), the basic hereditary and virus material. The mixture required the addition of a small amount of DNA as a primer as well as magnesium ions. (The net synthesis of DNA exceeded that added as a primer by twentyfold.) The enzymatically synthesized product had the same structure as proposed by Watson and Crick for natural DNA (two nucleic acids chains which wind around each other in a double spiral). Chemical understanding of DNA replication increases our knowledge of heredity, and the reproduction of viruses. Since one of the hypotheses held by medical scientists is that the synthesis of DNA differs in cancer cells from that in normal cells, the key to understanding cancer may lie in just such experiments.

VIRULENCE OF BACTERIA DETERMINED BY ADDITION OF CELLULAR COMPONENTS.—As previously mentioned, the biological properties of DNA, a vital constituent of the nucleus of all animal and plant cells, are of paramount importance since this compound is closely associated with the process of reproduction and the transmission of hereditary factors.

In recent studies on the growth of a number of different bacterial species (e. g., *Brucella abortus, Diplococcus pneumoniae*), it has been found that addition of a mixture of bacterial DNA and deoxyribonuclease (DNAase)—the enzyme specific for its hydrolysis—to growing cultures of these organisms produces striking effects upon the selective establishment of virulent cells in an initially nonvirulent population. Two different mechanisms are operative in causing this effect—a selective inhibition of the growth of nonvirulent cells (Brucella) or a selective stimulation of the multiplication of virulent cells (pneumococci), which may be associated with increased DNA synthesis. In addition to this

striking effect on bacterial cells, experimental evidence indicates that these DNA-DNAase digests are capable of stimulating the rate of multiplication of lymphosarcoma cells in mice. Certain antagonists to the DNA-DNAase effect, such as protamines, DNA-protein antisera, and kinetin riboside have been observed. One of these (kinetin riboside) produces increased selective inhibitory effects against virulent pneumococci and lymphosarcoma cells when administered in combination with DNA and DNAase.

Information of this sort concerning the factors and mechanisms which are involved in determination of the relative virulence of microorganisms is of considerable interest because of its relationship to an understanding of the phenomena of resistance and susceptibility to infectious diseases as well as to a possible therapeutic treatment of infections and malignant disease.

Exploration of South American "Lost World".—The Guyana Highland, the principal mountain-mass of South America north of the Amazon and east of the Andes, lies in southern Venezuela, with conspicuous extensions into Brazil, Colombia, and the Guianas. It is a spectacular area of numerous discontinuous and isolated tabular mountains characteristically ringed by high vertical cliffs whose summits are continuously wreathed in clouds of overhanging mists. Threaded by uncharted rivers, and uninhabited except for small groups of often hostile Indians, this is the "Lost World" hinted at by Conan Doyle and W. H. Hudson. Until 1944 only a few fringes of this vast unknown region had been touched by scientists. Since that time a program of exploration has taken place which, even in these modern times when the world's surface is thought to be known, is a classic comparable to the discoveries of a century ago. A totally unsuspected mountain, now named Neblina, 50 miles long and 10,500 feet high, has been discovered by a group of scientists who have made 18 expeditions in the Guyana Highland during the past 14 years.

The flora of this region, now being made known for the first time, is spectacular in the extreme, containing an extraordinary number of unsuspected native plants at the level of genus and species. Furthermore, the region appears to be the center of distribution for many ancient groups of plants. The explorers have now reached the end of a phase of their work and are turning to detailed study and evaluation of the many thousands of collected specimens. A fuller knowledge of this flora will provide biogeographers with data crucial to a knowledge of plant distribution throughout tropical America.

Facilities for Research in the Biological and Medical Sciences

During fiscal year 1958, grants were made for facilities support at a cost of slightly less than $1 million. Among these grants was one for $544,250 to the Marine Biological Laboratory at Woods Hole, Massachusetts, to cover one-fourth the cost of constructing a new research laboratory building and the complete cost of constructing 25 cottages for housing scientists and their families. The new research building will replace 3 antiquated wooden laboratory buildings and will provide additional working space. The Rockefeller Foundation is providing one-half, and the National Institutes of Health one-fourth, of the total laboratory costs. By providing additional housing, this grant will enable scientists, especially younger ones with growing families and limited incomes, to take advantage of the Laboratory's facilities for summertime research. Many have been discouraged by the economics of the situation—in this case, the cost of rental housing in a summer resort area.

A grant of $200,000 was made to the Jackson Memorial Laboratory to permit building an addition to the main building to satisfy immediate and pressing research space. The two other sizable facility grants were those to the Missouri Botanical Garden ($60,000) for herbarium and library facilities for botanical research, and to the Museum of Comparative Zoology, Harvard University ($300,000) for museum facilities for research in systematic zoology and paleontology.

Somewhat related to facility support were a number of equipment-type grants of a size beyond that normally encountered in ordinary research proposals. These varied from a grant for an ultracentrifuge to grants for the purchase and installation of electron microscopes. In all cases, equipment grants were made on a basis of the quality of the research program in which the equipment was to play an integral part. In the case of electron microscopes, it also was the practice of the Division to have assurances from the recipient institution that it would participate in the support of the microscope by providing for a full-time operator whose salary was to come from the institution receiving the equipment.

DIVISION OF MATHEMATICAL, PHYSICAL, AND ENGINEERING SCIENCES

Current Research Support

The *Astronomy* program, perhaps more than any other discipline, has felt the impact of the new interest in space. The excitement and importance of what was sometimes considered mere star-gazing are rapidly

becoming apparent. For example, studies of the minor planets, which number in the tens of thousands, will give their locations to the degree of accuracy required for navigation in interplanetary space. The sun, too, is the object of intensive study to answer such questions as: How does the sun eject cosmic rays? What is the precise nature of the sun's surface? These and many other questions have taken on new importance, and answers for them are being sought.

Grants in the *Chemistry* program have continued to emphasize organic and physical chemistry, with support also for inorganic and analytical chemistry. The special support provided for basic research in high polymers was continued during the year, but plans have been made to incorporate this support within the framework of the existing subdisciplines. Of special interest are grants involving total synthesis and reaction mechanisms.

Fields of special emphasis in the *Earth Sciences* program included geochemistry, which is becoming more and more identifiable with classical geology, and meteorology. The other fields have remained in about the same relative positions from the standpoint of support received, and include geology, oceanography, geophysics, and aeronomy. A new program for *Atmospheric Sciences* will be established in fiscal year 1959, to deal primarily with meteorology and the sciences basic to meteorology, including phenomena of the upper atmosphere.

The research supported by the *Engineering Sciences* program is by its nature more nearly part of a "closed feedback loop" in that the need for further basic study is frequently brought to focus through applications of previous research. Grants were made in the fields of mechanics of solids, transfer and rate mechanisms, thermodynamics, properties of materials, fluid mechanics, and electrical theory.

The *Mathematical Sciences* program, on the other hand, is perhaps the farthest removed from "feedback." It continues to support research in areas of applied mathematics as well as in algebra, analysis, topology, and geometry. Mathematical research, of course, differs from research in the experimental sciences in that it cannot be done by designing and performing an experiment, but must be carried out by the mathematician thinking about the problem.

The *Physics* program placed major emphasis on high energy physics, particularly involving the interactions of elementary particles. The program has found grants to be especially effective when they provide either for scientists in smaller institutions to work with those from larger ones, or for team attacks through which staff members of several small institutions join together on a problem.

CLOUD SEEDING PROVIDES BASIC WEATHER MODIFICATION KNOWLEDGE.—The increasing attention paid to the possibilities of weather modification, such as production of rain to alleviate dry spells, has dramatized the lack of knowledge of the basic processes which cause weather and atmospheric conditions. Interpretation of the much publicized cloud-seeding experiments has largely been speculative, for the basic physics of clouds is as yet largely unexplored. A series of National Science Foundation grants have begun to make up the deficiences in knowledge in this area. In one case, clouds developing day after day in the same place, near Tucson, Arizona, were observed visually with stereographic cameras, and with radar. Areas of cloud development were seeded on certain days selected at random, and the results were compared with those of nonseeded days. Although the number of tests was not sufficient to determine statistically how effective seeding may be, the radar showed that precipitation from larger seeded clouds appeared to be greater than from similar unseeded ones. This represents a real gain in our understanding of how the seeding of cumulus clouds can result in an increase in precipitation.

ULTRASONIC WAVES USED FOR NEUROSURGERY.—Because of interest in what happens as a result of intense uniform concentration of ultrasonic waves (those with frequencies which are far above normal hearing level), a neurological instrument was developed under a Foundation grant which employs ultrasonic waves rather than cutting edges. This device focuses sound waves into extremely small precise regions in the brain, permitting much more detailed study and understanding of various portions of the brain. A most important aspect of the new tool is that it may be employed to cut out tiny regions of the inner brain without disturbing the outer structure. This type of bloodless surgery has been used in abating the tremor of Parkinson's disease.

STREAM MODEL MAY AID IN FLOOD CONTROL.—Basic engineering research on the effects of underwater dunes on the roughness, velocity, and sediment-transporting capacity of a stream may well revolutionize thinking about flood control and care and use of natural waterways. A laboratory model of a stream used in conjunction with a high-speed motion-picture camera has resulted in clarification of the motion of individual sand grains in a flowing stream. The entire pattern of sand dune movement has been speeded up through use of the model. Basic knowledge has been supplied which, when applied to particular conditions in specific streams, can bring about more efficient and soundly based flood-control programs.

PEGMATITE FORMATION GIVES CLUE TO LOCATION OF IMPORTANT MINERALS.—One of the most puzzling rocks found in the earth's crust is called "pegmatite," or "giant granite." The pegmatites contain minerals commonly found in granites, but in much larger crystals. These large crystals are easily mined and separated, so that pegmatites consitute our chief source of certain mineral commodities, such as feldspar (used as an abrasive) and mica (used as electrical insulation). Also, large crystals of rare minerals in pegmatites are our principal source of elements, such as lithium and beryllium. How did such large crystals grow? Most geologists have believed that the giant crystals must have been deposited from hot dilute solutions rich in volatiles. The excess water was presumed to have escaped upward to the earth's surface.

Recent field and laboratory studies have upset the old ideas. The hypothesis has now been evolved that pegmatites are relatively dry melts (magmas) and are closed physico-chemical systems, and that the giant crystals are formed during a "second boiling." Early crystallization releases latent heat and enriches the residual magma in water enough to saturate it. At this point a vapor phase is produced, which is responsible for both the transport of the material and the formation of the giant crystals. Laboratory tests have confirmed these ideas; miniature pegmatites actually have been produced.

This is of great practical interest in guiding the exploitation of known bodies of pegmatite minerals and in searching for undiscovered deposits, for it shows that such deposits wil be shallow and contained within a limited area. In addition, since the phenomenon apparently applies to other types of molten rock, many other investigations are suggested which may lead to information about the origin of various ores and the discovery of additional sources of these ores.

REACTIONS OF FREE RADICALS STUDIED IN SLOW MOTION.—Atoms or groups of atoms bonded together by pairs of electrons can be split to yield positive and negative ions. For example, atoms "A" and "B" bonded by two electrons can be split to yield "A" with a positive charge and "B" with a negative charge and both electrons attached to it. Another kind of split yields neutral "free radicals", i. e., atoms "A" and "B" with one electron attached and no charge. Such free radicals are among the most reactive species known to chemists, and have long defied study because of their extreme instability, that is, their tendency to recombine almost at once. Recently techniques have been worked out whereby the free radicals are formed and immediately trapped on cold surfaces (20° K., or −424° F.). This freezing permits detailed spectroscopic study of their properties, and a slow warming of the surface per-

mits investigation in "slow motion" of their reactions. For example, a National Science Foundation grantee has formed such a free radical, CH_2, and has brought about its reaction with ethene, ketene, and other compounds, a yield cyclopropane, cyclopropanone, and the like—reactions which would not take place at ordinary temperatures. The combination or reaction of these free radicals produces a vast amount of energy, which, if it could be captured, would be promising for rocket propulsion. The radicals might also be used as unique reagents to carry out otherwise unattainable chemical syntheses.

GRAVITY STUDIES REVEAL EARTH SUBSTRUCTURE.—Recent geological and geophysical work in Utah and eastern Nevada has shown that the rock structure of the area is exceedingly complex. A team of researchers under a grant from the National Science Foundation has made detailed measurements of variations in the pull of gravity throughout the area and, from these variations, has been able to chart the major contours of the buried bedrock and obtain important clues as to the configuration of fault blocks and other structural patterns. This represents a significant advance in the technique of "underground mapping." In addition, the fact that these particular structural patterns have now been mapped may be of economic importance in determining where mineral deposits and ground water are likely to be found. These patterns are also important because of the relationship between the faults and earthquake hazards in the region. In the Salt Lake region, for example, earthquakes tend to occur along the Wasatch fault zone, which passes through Salt Lake City and was mapped in part by this survey.

CHEMISTS CONSTRUCT MOLECULES BY STEREOSPECIFIC SYNTHESIS AND POLYMERIZATION.—Organic chemists have long been aware that a given compound can exist in two or more forms which differ only in the geometric relationship of a given atom or group to the rest of the molecule. Only recently, however, has the vital importance of this spatial arrangement or "molecular configuration" been appreciated. Very often one form will possess much greater biological activity than its isomers. Therefore, chemists have put much effort into learning how to manipulate molecules to produce the desired configurations.

One researcher partially supported by a Foundation grant has successfully completed the total stereospecific synthesis (producing only the desired molecular configuration) of several antibiotics. The techniques devised for doing this can be applied to future syntheses, thus leading to new antibiotics. Another grantee recently announced the first total stereospecific synthesis of the alkaloid yohimbine, after four years of work.

Yohimbine is structurally related to reserpine, which has found use as a tranquilizer and hypertensive agent. This work thus paves the way for synthesis of the structurally more complicated reserpine, and ultimately of improved derivatives.

Other workers have been studying the molecular configurations of compounds which can undergo polymerization to yield high molecular weight compounds. One researcher has produced a substance which is identical with natural rubber in its physical characteristics, by carefully controlling the spatial relationships of the groups in the molecule. Through this control of configuration, many new synthetic substances—potential fibers, rubbers, and plastics—have already been produced and are being considered by industry for development.

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

Facilities support in this area during 1958 totaled approximately $5 million. A supplemental award of $1,130,000 was made to the Associated Universities, Inc., for the construction of the National Radio Astronomy Observatory in Green Bank, W. Va. This is in addition to a previous grant of $4,000,000. Complete installation of an 85-foot Blaw-Knox equatorially mounted paraboloid telescope is expected before the end of calendar year 1958. Design of a 140-foot telescope has been completed, and a contingent contract for construction has been signed.

After a 3-year program of site survey and testing, the National Optical Astronomy Observatory will be established at Kitt Peak, Arizona. The Association of Universities for Research in Astronomy, Inc., has been given a grant of $3,100,000 to go ahead with construction. Plans for a 36-inch reflecting telescope and associated housing have already been completed. Designs for an 80-inch telescope are being developed. A permanent director for the Observatory, Dr. A. B. Meinel, was appointed.

Three grants for computer installation were made—$50,000 to the University of Oklahoma, $50,000 to Iowa State University, and $100,000 to the University of Minnesota.

Support for nuclear reactors was provided to two universities—$150,000 to the University of Virginia, and $300,000 to the State College of Washington.

SOCIAL SCIENCE RESEARCH PROGRAM

On August 1, 1957, a unified Social Science Research Program was established as an outgrowth of a 4-year study of the Foundation's re-

sponsibilities within this area. The new program replaces the program in "convergent fields of natural and social sciences" previously conducted by the two research divisions, and is concerned with selected fields in the scientific study of human social behavior. The present Social Science Research Program includes four areas: anthropological sciences, sociological sciences, economic sciences, and the history and philosophy of science.

Current Research Support

The *Anthropological Sciences* program includes basic research in archaeology, physical anthropology, ethno-botany, ethnology, psycholinguistics, and related fields. One project is concerned with the utilization of electronic computers in linguistic analysis. Another grantee is studying the order and acquisition of consonant clusters in child language. An archaeological investigation and a study of an aboriginal American Indian group by a team of anthropologists, biologists, and geographers may yield knowledge of the relationships of culture, ecology, and environmental adaptation.

A grantee in the *Sociological Sciences* is exploring new techniques in research on migration. The achievement and potential of Soviet science, as viewed by American scientists returning from Russia, is the subject of another study. In still a third area an investigator is studying problems of identification and family structure to determine how variations in parental behavior may affect the child's personality.

Problems of primary importance to the Foundation, in the light of its congressional mandate to investigate the social and economic consequences of science, are encompassed in the *Economic Sciences.* One grantee is investigating technological change from an econometric point of view, while another is studying the economics of invention. A third grant is mentioned below under research developments.

Grants were made in the area of *History and Philosophy of Science* for research on early American science, on the origins of anatomy and physiology, and on the philosophical foundations of physics.

Significant Research Developments

COMPUTERS PROGRAMED TO PREDICT BUSINESS CYCLES.—The results of a study on the use of electronic computers in analyzing current economic indicators, which has received an additional grant for refinement of techniques, have significantly advanced computer-analysis knowledge.

In the past, seasonal and irregular business fluctuations, usually much larger than changes in underlying cyclical or major trends, made trustworthy prediction most difficult. The new method provides a quicker and more sensitive measure for determining the stages of the business cycle and separates meaningful trends from temporary irregularities. It is already in use and has proved of value both to Government and private industry in gauging the direction and strength of current trends.

Scientific Conferences and Symposia

During the past fiscal year, the Foundation sponsored and provided partial support for 34 scientific conferences and symposia. In most instances sponsorship was shared with one or more private or public agencies, including universities and scientific societies.

INTERNATIONAL CONFERENCE ON CURRENT PROBLEMS IN CRYSTAL PHYSICS—Cambridge, Massachusetts, July 3–6, 1957; Chairman: John C. Slater, Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts; Cosponsors: Massachusetts Institute of Technology, The International Union of Pure and Applied Physics.

CONFERENCE ON NATURAL AND SYNTHETIC MINERALS—University Park, Pennsylvania, July 5–8, 1957; Chairman: Joseph V. Smith, Department of Mineralogy, Pennsylvania State University, University Park, Pennsylvania; Cosponsor: Pennsylvania State University.

FOURTH GENERAL ASSEMBLY AND CONGRESS OF THE INTERNATIONAL UNION OF CRYSTALLOGRAPHY—Montreal, Canada, July 10–19, 1957; Chairman: John S. Coleman, National Academy of Sciences—National Research Council, Washington, D. C.; Cosponsors: Philips Electronics, Inc., Research Corporation, General Electric Co.

WORLD CONFERENCE ON PRESTRESSED CONCRETE—Berkeley, California, July 28–August 1, 1957; Chairman: T. Y. Lin, University of California, Berkeley, California; Cosponsors: University of California, American Society of Civil Engineers, American Institute of Architects, American Association of State Highway Officials, American Concrete Institute, Prestressed Concrete Institute.

CONFERENCE ON LIQUID SCINTILLATION COUNTING—Evanston, Illinois, August 20–22, 1957; Chairman: Carlos G. Bell, Jr., The Technological Institute, Northwestern University, Evanston, Illinois; Cosponsor: Northwestern Technological Institute.

FIFTH INTERNATIONAL CONFERENCE ON LOW TEMPERATURE PHYSICS AND CHEMISTRY—Madison, Wisconsin, August 26–31, 1957; Chairman: Joseph R. Dillinger, Department of Physics, University of Wisconsin, Madison, Wisconsin; Cosponsors: University of Wisconsin, International Union of Pure and Applied Physics.

GORDON RESEARCH CONFERENCES—New Hampshire, Summer 1957; Chairman: W. George Parks, Department of Chemistry, University of Rhode Island, Kingston, Rhode Island; Cosponsor: American Association for the Advancement of Science.

CONFERENCE ON PHOTOCHEMISTRY OF SOLID AND LIQUID SYSTEMS—Dedham, Massachusetts, September 3–7, 1957; Chairman: Farrington Daniels, Department

of Chemistry, University of Wisconsin, Madison, Wisconsin; Cosponsor: National Academy of Sciences—National Research Council.

SYMPOSIUM ON SYSTEMATICS: BASIC CONCEPTS AND TECHNIQUES IN SYSTEMATICS—St. Louis, Missouri, October 25–26, 1957; Co-Chairmen: Carl Epling, University of California, Los Angeles; and Ernest Mayrl, Harvard University, Cambridge, Massachusetts; Cosponsor: Missouri Botanical Garden.

SYMPOSIUM ON PHOTOPERIODISM—Gatlinburg, Tennessee, October 29–November 2, 1957; Chairman: Robert B. Withrow, Smithsonian Institution, Washington, D. C.; Cosponsors: None.

CONFERENCE ON THE CHEMISTRY OF SULFUR AND CHLORINE COMPOUNDS IN THE ATMOSPHERE—Cincinnati, Ohio, November 4–6, 1957; Co-Chairmen: J. P. Lodge, Jr., Robert A. Taft Sanitary Engineering Center of the Public Health Service, Cincinnati, Ohio; and Waldo E. Smith, American Geophysical Union, National Academy of Sciences—National Research Council, Washington, D. C.; Cosponsors: Public Health Service, National Academy of Sciences—National Research Council.

SIXTH INTERNATIONAL CONFERENCE ON COASTAL ENGINEERING—Gainesville, Florida, December 2–7, 1957; Chairman: Murrough P. O'Brien, The Council on Wave Research, University of California, Richmond, California; Cosponsors: University of Florida; The Council on Wave Research, University of California.

CONFERENCE ON HIGH TEMPERATURE RESEARCH—Chicago, Illinois, December 11–13, 1957; Chairman: Mark G. Inghram, Department of Physics, University of Chicago, Chicago, Illinois; Cosponsor: University of Chicago.

CONFERENCE ON NUCLEAR SIZES AND DENSITY DISTRIBUTIONS—Stanford, California, December 17–19, 1957; Chairman: Robert Hofstadter, Department of Physics, Stanford University, Stanford, California; Cosponsor: Stanford University.

INTERNATIONAL SYMPOSIUM ON THE AXIOMATIC METHOD—Berkeley, California, December 26, 1957–January 4, 1958; Co-Chairmen: Delon Henkin and Alfred Tarski, Department of Mathematics, University of California, Berkeley, California; Cosponsors: University of California, International Union for the History and Philosophy of Sciences.

CONFERENCE ON BIOCHEMICAL AND SEROLOGICAL CHARACTERIZATION OF PROTEINS—New Brunswick, New Jersey, January 24–25, 1958; Chairman: Alan Boyden, The Serological Museum, Rutgers, The State University, New Brunswick, New Jersey; Cosponsor: Rutgers, The State University.

SYMPOSIA ON THE STRUCTURE AND FUNCTION OF MICROSOMAL PARTICLES AND ON THE NATURE OF MUSCLE PROTEIN—Cambridge, Massachusetts, February 5–7, 1958; Chairman: Cyrus Levinthal, Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts; Cosponsor: The Biophysical Society.

A SEMINAR SERIES ON DEVELOPMENTAL BIOLOGY—New York, New York, February 5–March 13, 1958; Chairman: Paul Weiss, Laboratory of Developmental Biology, The Rockefeller Institute, New York, New York; Cosponsor: Rockefeller Institute.

CONFERENCE ON RESEARCH POTENTIAL AND TRAINING IN THE MATHEMATICAL SCIENCES—Chicago, Illinois, February 12–13, 1958; Chairman: A. A. Albert, Division of Mathematics, National Academy of Sciences—National Research Council, Washington, D. C.; Cosponsors: University of Illinois, National Academy of Sciences—National Research Council, University of Chicago.

CONFERENCE ON BASIC ENGINEERING SCIENCES RESEARCH IN THE WEST—Boulder, Colorado, February 17–18, 1958; Chairman: W. G. Worcester, Engineering Experi-

ment Station, University of Colorado, Boulder, Colorado; Cosponsor: University of Colorado.

SYMPOSIUM ON CELESTIAL MECHANICS—New York, New York, March 17–18, 1958; Chairman: Jan Schilt, Rutherford Observatory, Columbia University, New York, New York; Cosponsor: Columbia University.

SYMPOSIUM ON THE CHEMICAL BASIS OF DEVELOPMENT—Baltimore, Maryland, March 24–27, 1958; Chairman: William D. McElroy, Department of Biology, Johns Hopkins University, Baltimore, Maryland; Cosponsor: The McCollum-Pratt Institute of Johns Hopkins University.

CONFERENCE ON SALT MARSH RESEARCH—Sapelo Island, Georgia, March 25–28, 1958; Chairman: Robert A. Ragotzkie, University of Georgia Marine Biology Laboratory, Sapelo Island, Georgia; Cosponsor: University of Georgia Marine Biology Laboratory.

THIRD ANNUAL MIDWEST CONFERENCE ON THEORETICAL PHYSICS—St. Louis, Missouri, March 1958; Chairman: Edward U. Condon, Department of Physics, Washington University, St. Louis, Missouri; Cosponsor: Washington University.

CONFERENCE ON SYSTEMATIC BIOLOGY IN PRIVATE INSTITUTIONS—Philadelphia, Pennsylvania, May 19–20, 1958; Chairman: H. Radclyffe Roberts, The Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania; Cosponsor: The Academy of Natural Sciences of Philadelphia.

SYMPOSIUM ON SULPHUR IN PROTEINS—Falmouth, Massachusetts, May 23–24, 1958; Chairman: Reinhold Benesch, Marine Biological Laboratory, Woods Hole, Massachusetts; Cosponsors: American Heart Association, Marine Biological Laboratory.

CONFERENCE ON COMPARATIVE ENDOCRINOLOGY—Cold Spring Harbor, New York, May 26–29, 1958; Chairman: Aubrey Gorbman, Department of Zoology, Columbia University, New York, New York; Cosponsor: Columbia University.

CONFERENCE ON HYPERCONJUGATION—Bloomington, Indiana, June 2–4, 1958; Co-Chairmen: V. J. Shiner, Jr., and E. Campaigne, Department of Chemistry, Indiana University, Bloomington, Indiana; Cosponsors: Indiana University Alumni Foundation, American Cyanamid Company, Eli Lilly and Company, Esso Research and Engineering Company, Humble Oil and Refining Company.

XXIII COLD SPRING HARBOR SYMPOSIUM ON QUANTITATIVE BIOLOGY—Cold Spring Harbor, New York, June 3–11, 1958; Chairman: Bruce Wallace, Biological Laboratory, Long Island Biological Association, Cold Spring Harbor, New York; Cosponsors: Carnegie Corporation of New York, Association for the Aid of Crippled Children, The National Institutes of Health.

CONFERENCE ON THE STRUCTURE OF MUCOPOLYSACCHARIDES—Ipswich, Massachusetts, June 5–7, 1958; Chairman: Endre A. Balazs, The Retina Foundation, Boston, Massachusetts; Cosponsor: The Retina Foundation.

17TH GROWTH SYMPOSIUM: DIFFERENTIATION AND GROWTH IN RESPONSE TO A CHANGING CHEMICAL ENVIRONMENT—South Hadley, Massachusetts, June 9–11, 1958; Chairman: James D. Ebert, The Carnegie Institution of Washington, Baltimore, Maryland; Cosponsor: The Society for Study of Development and Growth.

SYMPOSIUM ON STATISTICAL METHODS IN RADIO WAVE PROPAGATION INVESTIGATIONS—Los Angeles, California, June 18–20, 1958; Chairman: W. C. Hoffman, Department of Engineering and Engineering Extension, University of California, Los Angeles, California; Cosponsor: University of California, Los Angeles.

INDUSTRY-UNIVERSITY CONFERENCE ON RESEARCH ON ELECTRICAL ENGINEERING—Columbus, Ohio, June 19–20, 1958; Chairman: M. S. Oldacre, Stanford Research Institute, Menlo Park, California; Cosponsors: American Institute of Electrical Engineers Committee on Research, Ohio State University.

CONFERENCE ON ANALYSIS OF COMPOSITE RADIATION FROM STELLAR SYSTEMS—Madison, Wisconsin, June 30, 1958; Chairman: A. E. Whitford, Washburn Observatory, University of Wisconsin, Madison, Wisconsin; Cosponsor: University of Wisconsin.

Research-Related Activities

Support of Travel to International Scientific Meetings

Because direct contact among scientists is important to the advancement of scientific knowledge, the Foundation partially defrays travel expenses for a limited number of American scientists to attend selected international meetings and congresses abroad. In addition, travel grants are sometimes made for such purposes as visits to laboratory or research sites. The awards to the scientist generally amount to round trip air-tourist fare between his home institution and the location of the meeting. In 1958, 190 scientists received such grants at a cost of $113,220.

Training Aspects of Research Grants

Research grants play an important role in the training of both predoctoral and postdoctoral research assistants and associates. During 1958, approximately 1,165 in this category received advanced training through participation in research projects under the direction of many of the Nation's most capable scientists.

When this number is added to the 1,348 awards made through the Foundation's formal fellowship programs, we find that a total of 2,515 have been given the chance to further their scientific education and to gain valuable laboratory experience while working under the aegis of seasoned and highly competent investigators.

Miscellaneous Grants

Among these are support for short-term research by medical students, an extension of the previous year's program; grants to biological field stations to provide summer research training stipends for postdoctoral investigators, graduate students, and teachers from small colleges; grants to provide summer training for college and high school teachers who serve as research assistants to scientists; and support for an internship program in mathematical research under which postdoctoral mathematicians investigate selected fields of applied mathematics under special guidance.

Fiscal Analysis of Research Programs

The Foundation during the 1958 fiscal year made grants totaling $25,049,155 for the support of basic research in the sciences, including $5,934,250 for the maintenance and construction of research facilities. These funds provided 1,120 grants in the biological, medical, mathematical, physical, engineering, and social sciences to 293 institutions in all 48 States, Alaska, Bermuda, Canada, Great Britain, Hawaii, Lebanon, Puerto Rico, and Switzerland. Research grants for fiscal year 1958 averaged $18,085 for a period of 2.09 years, or about $8,653 a year.

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

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

National Science Foundation Research Grants by Fields of Science, Fiscal Year 1958

	Number	*Amount*
Biological and Medical Sciences:		
Developmental	48	$604,300
Environmental	78	953,600
Genetic	57	711,150
Metabolic	74	1,482,350
Molecular	78	1,609,100
Psychobiology	62	968,800
Regulatory	70	1,075,280
Systematic	103	1,036,450
General	35	440,100
	605	8,881,130
Mathematical, Physical, and Engineering Sciences:		
Astronomy	33	1,017,830
Chemistry	134	2,323,900
Earth Sciences	70	1,246,395
Engineering	88	1,538,400
Mathematics	72	1,242,100
Physics	69	2,139,200
	466	9,507,825
Social Sciences:		
Anthropology	22	384,100
Sociology	14	182,100
Economics	5	93,300
History and Philosophy of Science	8	66,450
	49	725,950
Total	1,120	19,114,905

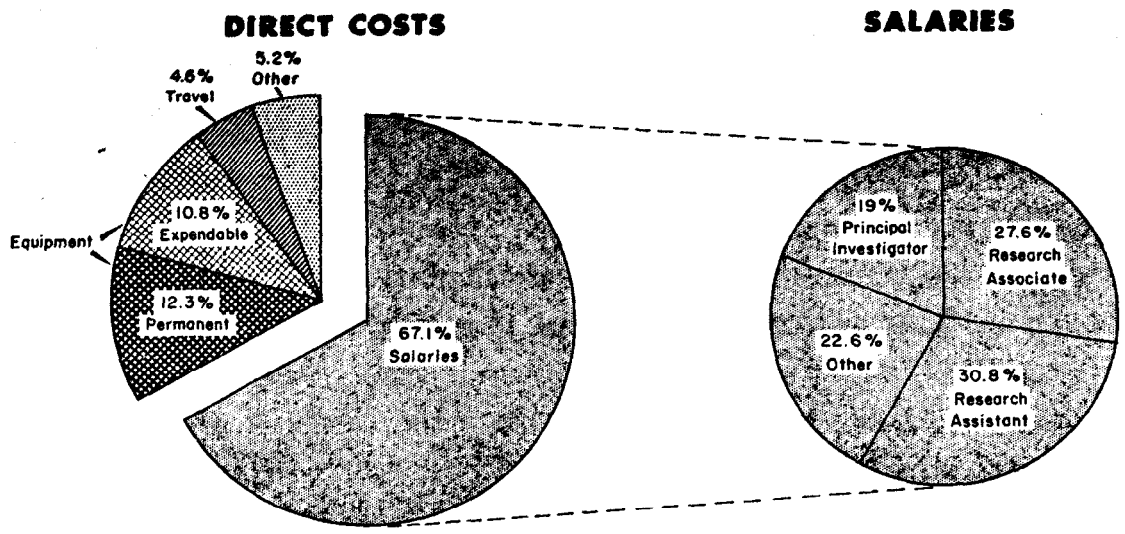


Figure 1.—*Analysis of the average National Science Foundation Research grant in fiscal year 1958 by types of expenditures (estimated).*

Analysis of Salaries Paid From Research Grant Funds,[1] Fiscal Year 1958

	Average grant, fiscal year 1958	
	Amount	*Percent of salaries*
Principal Investigator (total)	$2,027	19.0
Summer	(1,503)	(14.1)
Sabbatical	(84)	(.8)
Academic	(440)	(4.1)
Research Associate [2]	2,953	27.6
Research Assistant [3]	3,283	30.8
Other [4]	2,412	22.6
Total	10,675	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 institituon when they are doing the research.

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

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

From figure 1 and the accompanying table, it can be seen that salaries accounted for 67.1 percent and equipment 23.1 percent of the total funds distributed. Indirect costs were estimated at 13.6 percent of direct costs.

TRAINING AND EDUCATION IN THE SCIENCES

The program activities of the Division of Scientific Personnel and Education are directed toward encouraging policies that will insure that the Nation's educational system will produce enough highly trained scientists, engineers, science teachers, and other scientific workers to meet our ever-increasing national needs.

The most serious and urgent problem at the present time in the training of future scientists and engineers is not to find great numbers of additional students, but to provide a high caliber of training in science for the competent student who will seek it. In addition to properly motivated, capable students, a high quality of science instruction requires a sufficient number of well-trained, dedicated teachers. It also requires text and instructional materials which both reflect the current status of scientific knowledge and meet the needs of the students.

Among the approximately 140,000 high school teachers of science and mathematics, there are admittedly a goodly number of well-trained full-time teachers, but a significant fraction of the total group is not adequately trained to teach either modern science or mathematics with optimum efficiency. A great many of these teachers are aware of their academic deficiencies and are eager to improve their qualifications. Evidence is provided by the fact that in the spring of 1958, 16,000 science and mathematics teachers applied for admission to Foundation-supported Summer Institutes—approximately 1 in every 9 high school science and mathematics teachers in the country.

Although it is sometimes stated that the problem of providing new teachers to meet expanding enrollment is a more serious one than the upgrading of present teachers, the fact remains that these present teachers will bear the brunt of the teaching load for a number of years. Since they will be providing the leadership and much of the in-service training for their newly graduated colleagues, it is of prime importance that these already committed teachers receive the training that they themselves deem necessary.

A crucial factor involved in providing a continuing high level of excellence in the training of our future college and university science

students is an adequate supply of well-qualified faculty members. In 1955, colleges and universities employed less than 200,000 teachers; by 1970, approximately one-half million will be needed. Evidently, financial and other inducements at present are not strong enough to attract our most capable science scholars into teaching.

One NSF study has shown that in 1953–54, more than 3 out of 4 of our college and university teachers were over 34 years of age, 44 percent were over 44 years old. More than one-third were between 45 and 60 years of age; many of these will be retired when the large enrollment reaches college in the 1970's.

The prospect of progressive erosion in the quality of faculties is real. Using the ratio of faculty members holding doctorates to the total staff, the NEA has found that this ratio for all college faculties was 40.5 percent in the 1953–54 academic year. The President's Committee on Education Beyond the High School envisages a decline in this ratio to 20 percent by 1970—assuming generally accepted anticipated supply-and-demand conditions.

Of the new faculty in all fields hired during the 1953–54 and 1954–55 academic years, 30.8 percent held doctorates; by 1955–56, the percentage dropped to 26.7 and in 1956–57, to only 23.5. During 1953–54, 18.5 percent of all newly hired faculty had less than a master's degree. The percentage increased to 20.1 in 1955–56 and to 23.1 in 1956–57.

Even if we were able to solve the problems of providing enough competent teachers at all levels, the science training provided would still not be adequate. Too much of the content of science and mathematics courses in our high schools and colleges is outdated. The time lag between the discovery of new facts and their presentation in the classroom has always been a problem, but it has now become so serious as to pose a major threat to the effectiveness of our educational system. The task of modernizing the subject matter of science is one of tremendous proportions.

Evaluation of this country's scientific training needs requires the gathering and analysis of data dealing with scientific and technological personnel resources and with the educational system, especially the element which relates specifically to science education. Much of this needed information has not yet been obtained.

The objective of all Scientific Personnel and Education Division programs has been and will continue to be the alleviation of the critical situation resulting from the previously mentioned inadequacies in science education. The programs fall into four categories—Fellowships, Institutes, Special Projects in Science Education, and Scientific Manpower.

Fellowships Program

The fellowships program is designed to strengthen the Nation's scientific potential by providing support for advanced training in the sciences, mathematics, and engineering 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. A total of 1,527 fellowships were offered in fiscal year 1958; their value was approximately $5.6 million. (Accompanying tables show distribution of fellowship awards by type, field, and State.) In 1959 about 2,500 full-year and 1,200 summer fellowships are to be awarded.

National Science Foundation Fellowship Awards, by Type and Field, Fiscal Year 1958

Field	Predoctoral			Post-doctoral (regular)	Senior post-doctoral	Science faculty	Total
	First year	Intermediate	Terminal year				
Life sciences	65	122	63	59	32	67	408
Chemistry	76	95	53	33	12	37	306
Engineering	71	49	27	2	3	41	193
Earth sciences	18	26	14	2	4	9	73
Mathematical sciences	58	60	22	19	11	36	206
Physics and astronomy	98	111	40	33	11	21	314
Physical sciences general	0	0	0	0	0	1	1
Natural sciences general	0	0	0	0	0	4	4
Convergent fields	3	8	5	3	3	0	22
Total	389	471	224	151	76	216	1,527

Predoctoral

Now in its seventh year of operation, the predoctoral fellowships program is designed to offer support to unusually able students, thus enabling them to complete their graduate studies with the least possible delay. The prestige of these fellowships is so high that they are much sought after by top quality graduate science students. The objectives of the predoctoral fellowships program are best served by keeping these fellowships highly selective and highly competitive. From the 3,804 applications, a total of 1,084 fellowships were offered during 1958. In 1959, 1,000 fellowships will be awarded under this program.

National Science Foundation Fellowship Applications and Awards, Fiscal Year 1958

Region and State	Applications	Awards	Region and State	Applications	Awards
NORTHEAST			NORTH CENTRAL		
Connecticut	106	38	Illinois	344	111
Maine	21	7	Indiana	145	40
Massachusetts	283	88	Iowa	82	25
New Hampshire	28	7	Kansas	90	27
New Jersey	205	71	Michigan	178	51
New York	792	235	Minnesota	122	47
Pennsylvania	373	99	Missouri	112	26
Rhode Island	28	11	Nebraska	41	7
Vermont	11	5	North Dakota	17	3
			Ohio	201	61
SOUTH			South Dakota	26	5
			Wisconsin	117	40
Alabama	52	7			
Arkansas	33	9	WEST		
Delaware	18	5	Arizona	34	6
Florida	64	15	California	493	181
Georgia	41	9	Colorado	56	13
Kentucky	44	7	Idaho	25	7
Louisiana	44	5	Montana	16	2
Maryland	130	30	Nevada	8	1
Mississippi	30	8	New Mexico	17	3
North Carolina	76	18	Oregon	73	16
Oklahoma	75	11	Utah	56	18
South Carolina	28	2	Washington	112	39
Tennessee	60	14	Wyoming	11	5
Texas	179	43			
Virginia	79	25	POSSESSIONS		
West Virginia	22	5	Alaska	9	2
District of Columbia	42	11	Hawaii	9	4
			Puerto Rico	15	2

Regular Postdoctoral

Also in its seventh year, the regular postdoctoral fellowships program is designed to provide support to individuals who have recently received doctoral degrees in science to enable them to obtain additional high level training. In fiscal year 1958, 151 of the 513 applicants were offered regular postdoctoral fellowships. About 150 awards are planned for 1959.

Senior Postdoctoral

This 3-year-old program of senior postdoctoral fellowships provides opportunities for scientists who have demonstrated superior accomplish-

ments in a particular field to become still more proficient, by studying and doing research during a leave of absence from their regular positions. This program is kept highly individualized and variable in nature to adjust to the particular needs of the Fellow. In 1958, 76 fellowships were offered under this program selected from among 259 applications. About 75 awards will be made in 1959.

Science Faculty

The science faculty fellowships program, the newest of the Foundation's fellowship programs, was initiated during fiscal year 1957. It is designed to improve the quality of science teaching in our colleges, especially the small colleges. Many of these instructors were drawn into teaching with very little training beyond the bachelor's degree; others have been teaching for a good number of years with little opportunity for intellectual growth. These fellowships permit teachers belonging to either of these groups to undertake further study to increase their competence as teachers.

During fiscal year 1958, science faculty fellowships were offered to 216 of the 694 applicants. Plans for 1959 call for 300 awards.

New Fellowships Programs for Fiscal Year 1959

1. Cooperative Graduate Fellowships.—Similar to present predoctoral fellowships except that applicants will apply through the participating institution of their choice. The institution will then do the initial screening with final evaluation and selection by the Foundation. The institutions will also have the responsibility of administering certain funds associated with the program. Approximately 1,000 awards will be offered under this program in 1959.

2. Summer Fellowships for Graduate Teaching Assistants.—Permit graduate teaching assistants to pursue their own study programs full time during the summer months, thus shortening the time required to obtain their advanced degrees. This program should encourage more highly capable graduate students to accept teaching assistantships as a means of support during the academic year, thereby benefiting the student through the teaching experience he gains and benefiting the university through the availability of the most capable graduate students as teaching assistants. About 550 awards will be offered for the summer of 1959.

3. Summer Science Fellowships for Secondary School Teachers.—For in-service science and mathematics teachers in secondary

schools, who hold baccalaureate degrees. It permits the selected teachers to undertake a personal study program (extending over 1, 2, or 3 summers) leading to improved subject matter competence and often to an advanced degree. Approximately 750 awards are planned.

Institutes Program

Institutes are designed to improve the subject-matter competence of high school and college teachers of science and mathematics. During fiscal year 1958, they consisted of the following three types: (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. Expenditures for the 125 Summer Institutes, 19 Academic-Year Institutes, and 85 In-Service Institutes totaled $12.4 million.

The institutes are planned and conducted by colleges and universities. Beyond providing broad, general directives and the needed financial support, the Foundation does not participate in the operation of the institutes. It makes financial grants to institutions whose plans, as outlined in the proposals submitted to the Foundation, appear practical and most likely to result in the greatest benefit to the teachers who would enroll.

In order to determine efficiently and fairly which proposals would be supported, advisory panels are employed to review and evaluate the proposals received from colleges and universities. The membership of the panels is chosen from individuals recommended by the scientific societies and other sources as being highly qualified to render judgment in questions involving education in the sciences. The membership encompasses all disciplines in the natural sciences, including mathematics. Industrial as well as educational institutions are represented. High school teachers and officials from State departments of public instruction are among the members. The evaluations of the advisory panels determine in large measure the proposals which are supported. The directive of Congress "to avoid undue concentration" in carrying out the programs of education in the sciences is heeded in the final selection. Balance is sought in geographic distribution, and in representation of the various science areas and types of host institutions.

Summer Institutes

These institutes ordinarily provide courses that are tailormade to fit the needs of the teachers, most of whom completed their formal course work a number of years ago and frequently teach other subjects as well

as their specialty. In addition to the courses, the institutes commonly provide appropriate lecture series, opportunities for discussions, and informal activities that add to their value to participants.

Of the 126 Summer Institutes held in 1958, 5 were for college teachers only; 3, for both high school and college teachers; and the remaining 118 were for high school teachers only.

Three of the college institutes were for biology teachers, one was for geology teachers, and the fifth was for junior college teachers of chemistry, mathematics, or physics. The institutes for college and high school teachers were in biology, chemistry, and mathematics, respectively. Of the 118 institutes for high school teachers, 10 were in biology, 4 in chemistry, 12 in mathematics, 6 in physics, 1 in earth science, and 5 in general science. The remaining 80 offered courses in 2 or more areas. Twelve of the institutes for high school teachers were sponsored jointly with the Atomic Energy Commission and provided work in radiation biology.

Summer Institutes during 1958 were held in 47 States and in 3 Territories—Alaska, Hawaii, and Puerto Rico. New York had the greatest number, 7. There were 54 institutes west and 72 east of the Mississippi. There were 18 institutes in New England and New York, 31 in the other Eastern States and the District of Columbia, 19 in the Southeastern States, 23 in the Midwest Plains States, 18 in the Southwest including California, 13 in the Rocky Mountain and Northwest region, and 4 in the Territories.

The institutes varied in length, the shortest being 4 weeks, and the longest, 12. The average was 7 weeks. The number of participants in each institute varied from 20 to 110, and averaged 50. Participant support funds not needed for travel or dependents were used by many institutes to provide a few additional stipends. In all, approximately 6,000 high school teachers and 300 college teachers received support from National Science Foundation funds in the 1958 Summer Institutes.

The National Science Foundation grants provided funds for participant support. The maximum award to a participant was set by the Foundation at $75 per week for stipend, plus allowance for dependents and travel. Most institutes followed this schedule and granted the maximum allowable amounts to each awardee. (A few distributed their available funds in smaller amounts to more participants.) Many of the institutes accepted a few registrants beyond those who received stipends.

The Foundation grants to each institution paid necessary tuition and fees for the stipend holders, and paid the direct costs occasioned by the

institute to the extent that these exceeded the amount already allowed for tuition and fees.

FUTURE PLANS.—Continued expansion of the Summer Institutes program is expected in 1959 to a number in excess of 300. The Foundation expects to exercise greater latitude in providing opportunities to teachers at all levels for improvement of their mastery of science and mathematics. Although most of the 1959 Summer Institutes will doubtless be for high school and junior high school teachers, relatively more will be scheduled for college teachers. This will be of particular advantage to teachers in the small colleges and in teacher-training institutions. Thus, not only will present teachers be aided, but through them, prospective teachers also.

Elementary school science teaching is in drastic need of strengthening. Therefore, a number of experimental Summer Institutes for elementary school supervisors and teachers is being planned. It may even be possible to provide for other groups of teachers not yet reached—those in technical institutes not offering the baccalaureate degree.

Academic-Year Institutes

In fiscal year 1958 the Foundation awarded grants to 19 universities for Academic-Year Institutes to be conducted during the 1958-59 school year. The courses in these institutes are based on the subject matter of science and mathematics. High school teachers are able in many cases to earn a graduate degree such as the Master of Science in Science Education. In order to enable as many of the deserving teachers as possible to earn this degree, the Foundation has made it possible for the institutes to offer summer awards which permit the selected teachers to continue their studies during the summer following the Academic-Year Institute.

Foundation grants for these institutes provide a maximum stipend of $3,000, plus additional allowance for dependents and travel. Tuition and other fees are covered as well as an allowance for books.

Approximately 925 teachers will be trained in the 1958–59 program, and evidence gained from past programs indicates that very few of these teachers will leave the teaching profession—proportionately fewer, in fact, than normally leave teaching. It is also worthwhile to note that appointments were available for fewer than 10 percent of those who applied.

FUTURE PLANS.—In academic year 1959–60, the Foundation plans to support about 30 Academic-Year Institutes, the maximum level it is felt this program should attain.

In-Service Institutes

The Foundation initiated this program to fit the needs of high school teachers of science and mathematics through courses offered on Saturday morning or during after-school hours.

The success of the In-Service Institutes program during the previous 2 years resulted in support by the Foundation of 86 such institutes during the 1958–59 academic year. About 3,000 high school teachers are able to participate in this institute program which provides for their supplementary training in the subject matter of science and mathematics while at the same time, they maintain their teaching responsibilities. The institutes are located in 35 States, the District of Columbia, and Puerto Rico.

FUTURE PLANS.—Because of the popularity and proved value of this institute program, the Foundation plans to support about 200 In-Service Institutes for high school teachers of science and mathematics during the 1959–60 academic year. Considerable interest has been shown in the potential use of this mechanism to prepare teachers for dealing with the new materials being developed for teaching science and mathematics in the Course Content Improvement Program.

Extending the successful pattern established by the preceding programs, the Division proposes to initiate institutes of a similar type to serve the needs of elementary school teachers in their teaching of science and mathematics.

Special Projects in Science Education Program

Complementing the Institutes Program of the Foundation, this program is concerned principally with the experimental testing and development of promising new ideas for the improvement of science instruction, and with new and more effective methods of increasing the understanding of science on the part of our young people. Approximately $1.5 million was obligated in fiscal year 1958 to carry out this program. Projects fall readily into the three following types: (a) Student Participation Projects, (b) Teacher Training Projects, and (c) Course Content Improvement Studies.

Student Participation Projects

These projects are planned to enlist the interest in and understanding of science, mathematics, and engineering by students at all educational levels. Activities in this area that have been supported by the National Science Foundation include the following:

1. *The Traveling High School Science Library Program.*—In many areas of the United States high school students with an interest in science have little or no access to books about science and mathematics other than their textbooks. The primary purpose of this program is to furnish to secondary schools, on a loan basis, a carefully selected library of general-interest books chosen to cover a broad spectrum of science and mathematics. A secondary but important result is the stimulation of book purchases by school and other libraries in response to student demand.

The program is conducted for the Foundation by the American Association for the Advancement of Science. It was started on an experimental basis in fiscal year 1956, and has been expanded each year since then. In fiscal year 1958, 54 sets of 200 books each were circulated among 216 high schools. Each school receives 50 books at a time. Through periodic exchange, all 200 books are made available to each school served during the academic year. In the summer, the libraries are made available to Foundation-sponsored Summer Institutes.

A list of the books in the Traveling Science Libraries is published separately and is given wide distribution. It is being used in many communities as a guide to the purchase of books for libraries. A larger and more comprehensive list of science and mathematics books for secondary school and community libraries is being prepared, and a special list of science and mathematics books available in inexpensive paperbound editions is also issued to encourage students who wish to buy them for their own use.

An evaluation study of the program has been conducted applicable to the 1956–57 program which served 104 schools. This developed considerable information regarding the reading habits of high school students. Outstanding among the conclusions were the following:

a. In schools served by the Traveling Science Libraries, 39 percent of the students read at least one of the books. Half of these read more than three of the library books.

b. Small high schools make more intensive use of the library books than large schools.

c. At schools where there is a strong teacher interest in science, as determined by the number of library books checked out by the teacher, student interest in the books is more intense.

d. A majority of the schools served by the libraries subsequently added some science books to their own libraries. Lack of funds is the principal reason for not buying more books.

The Foundation plans to continue this program in the future, and to expand it as funds permit. There are over 13,000 high schools in the United States with a student body of less than 200 students.

2. *The Traveling Science Demonstration Lecture Program.*—Supported jointly with the Atomic Energy Commission and administered by the Oak Ridge Institute of Nuclear Studies, this program provides opportunities for secondary school students and teachers to see and hear science lecture demonstrations stressing the scientific principles involved in such subjects as solar radiation, atomic structure, nuclear reactions, space travel, and other subjects of scientific interest. Selected high school teachers are trained at Oak Ridge during a Summer Institute session and then during the academic year travel widely over the country providing lecture-demonstrations in selected high schools.

The training program for 1957–58 was much like that for the first year. Seven teachers were carefully selected for participation in the program and underwent a period of preparation and special training at Oak Ridge during the summer. The summer training period included courses and lectures on fundamentals of physical sciences, radioisotope techniques, science experiments, and techniques in science teaching.

Six weeks of the three-month summer session consisted of lectures and demonstrations in chemistry, physics, biology, and mathematics given by prominent scientists and teachers. Concurrently with the lecture-demonstration training, the traveling teachers designed and built many pieces of apparatus for use in their subsequent visiting lectures. Many of these inexpensive "home-made" assemblies were used as models which later were duplicated by high school teachers working with their students. During the 1957–58 school year the traveling teachers made visits of 1-week duration to 260 high schools throughout the country. They gave, on the average, one lecture-demonstration per day in the schools and were usually invited to provide many added lectures to parent and civic clubs. In addition to the schools visited, other neighboring schools were often reached while the teacher was in the community, so that a total of 892 schools (including some elementary schools) received at least one demonstration-lecture. More than 226,000 high school students and some 5,700 high school teachers were reached by this program.

The activities and previsits of the traveling teachers were cooperatively planned by the high school principals and the science departments of the various high schools. This cooperation aided the high school teachers to anticipate what would be covered by the visiting lecture-

demonstrator and permitted them to arrange their work in the science courses to fit into the material covered by the visitor.

From reports of school principals, teachers, and parents, there is abundant evidence that the high school traveling lecture-demonstration program has had increasing success. By May 1, 1958, the number of visits requested for the year 1958–59 had exceeded 3,200.

The 1958–59 program will make use of a group of 19 traveling teachers—7 completely supported by National Science Foundation and Atomic Energy Commission funds and at least 12 supported during the 9 months of the school year by State departments of education, with National Science Foundation funds covering the teachers' stipends during the summer months and Atomic Energy Commission funds providing the demonstration equipment.

The fact that educational systems in individual States are willing and able to include the Traveling Science Demonstration Lecture Program in their "normal" educational pattern is an indication of the validity of the program. It is a good indication that this program will probably function smoothly when it is expanded during the coming year to provide a more widespread coverage of schools.

3. *The Visiting Scientists Program.*—This is a program which enables distinguished scientists to visit small colleges and universities for periods of several days to give lectures, to conduct classes and seminars, and to meet students and faculty members on a formal as well as informal basis in order to stimulate interest in science.

The Visiting Scientists Program was initiated in the 1954–55 school year when the National Science Foundation made a grant to the Mathematical Association of America for a series of visits to various small colleges and universities. Since that time the program has been expanded to include similar programs in chemistry, physics, biology, and astronomy.

In the past year, grants have been made to the following organizations to support Visiting Scientists Programs: American Chemical Society, American Institute of Physics, American Institute of Biological Sciences, American Astronomical Society, and the Mathematical Association of America. About 500 visits to colleges and a few high schools will have been made during the academic year, reaching an audience of over 60,000 students. The visiting scientists and the administrators of the institutions visited, as well as the faculties and students, have expressed enthusiasm for the value of the program.

The present programs in mathematics, chemistry, biology, physics, and astronomy have proved so successful in arousing interest in the subject matter presented that in 1959 they will be expanded to make

more contacts possible. In addition, new scientific disciplines will be included, such as the earth sciences and engineering.

In view of the importance of interesting high school students in scientific careers, an active program, administered by appropriate scientific groups, will be developed in the next fiscal year, so that able scientists can visit high schools, lend their stimulus to science education at that important level, and provide a better appreciation of career opportunities.

4. *Science Clubs and Student Projects.*—This program stimulates interest in science and in scientific and engineering careers among students below the college level by supporting extracurricular science projects under the guidance of national youth organizations.

Since 1952, the National Science Foundation has been providing a limited amount of support to Science Clubs of America, administered by Science Service, Inc., a nonprofit organization with other sources of income. Approximately 19,500 local Science Clubs, composed predominantly of students of senior and junior high schools, are affiliated with Science Clubs of America. Each has an adult adviser, usually a science teacher.

Many club members carry out individual projects which frequently culminate in exhibits displayed at a school science fair. The most worthy of these are selected for showing at a city, regional, or State science fair, and each of these in turn usually selects two finalists who are sent, with their exhibits, to the annual National Science Fair.

At the National Science Fair held May 9–11, 1958, exhibits were shown by 281 finalists from 146 areas. The supporting fairs showed a more impressive growth rate. On the basis of reports from 98 of the 146 affiliated fairs, it is estimated that the 281 exhibits at the national fair were selected from a total of more than 468,000 exhibits at local fairs, an increase of 60 percent over the preceding year.

Public attendance at science fairs is encouraged. In 1958 attendance at the national fair was over 30,000, and an estimated 4 million persons saw the exhibits at the supporting fairs.

Geographic coverage of this program is extensive but not intensive. There are only three States where there are no science fairs, but few of the remaining States have anything approaching complete coverage. Of about 16 million students of the 7th through 12th grades, about 4 million would probably be interested in this kind of activity if the opportunity were available. Total membership in the 19,500 Science Clubs is estimated at about 500,000 students.

A recent study of National Science Fair finalists from 1950 to 1957 reveals a very high degree of interest in higher education. Of 589

individuals on whom data were received, 156 were still in high school and 23 were in military service. Of the remaining 410, 95 percent were taking college courses or had received a college degree.

In view of the results obtained from this program, the Foundation plans to continue its support of Science Clubs of America and also to explore the possibilities of science programs in cooperation with other national youth organizations such as the 4–H Clubs, Future Farmers of America, the Boy Scouts, and the Girl Scouts.

5. *Summer Training Program for Secondary School Students.*—A primary purpose of this program is to encourage the scientific interests of high-ability secondary-school students by providing them with opportunities to participate in study and research programs set up especially for such students by interested college groups.

Pilot programs supported for the summer of 1958 include those of two State university short summer institutes for high school students and one research foundation's summer-long research participation program. In the two university institutes—"science camps"—two or three weeks were devoted to lectures, laboratory experience, visits to other laboratories or museums, and field trips, together with orientation lectures in the various branches of science and mathematics. Their aim was to acquaint the students with the many facets of scientific activity so as to provide a better comprehension of the sciences and a better basis for a choice of future careers. In the Waldemar Research Foundation summer program, high school students participated in supervised research which not only complemented their wintertime classroom instruction, but also offered them the stimulation and intellectual discipline of experimental scientific research.

Both types of programs utilized high school science teachers as counsellor-participants, to the ultimate benefit of their future classes. In these 3 pilot projects, 145 students and 8 high school teachers participated.

High school students also took part as members of demonstration classes in mathematics and science which were part of the program of some of the Summer Institutes for high school teachers.

A number of other proposals for the summer of 1958 to aid in developing the scientific interests of high school students were received, but the Foundation was unable to support them all. However, for 1959, the Foundation expects to support as many as 80 such projects.

6. *Other Student Participation Projects.*—Included under this heading are projects such as support of the preparation and distribution of pamphlets and brochures describing career opportunities in the various

science disciplines and designed to awaken student interest; a program to bring to science teachers and their students, by means of poster exhibits, a balanced and comprehensive understanding of the IGY and a constructive realization of the interdependence of the scientific disciplines involved; studies of ways in which the Foundation can best provide assistance to State Academies of Science in furthering their interests in science education; production of pilot films relating to science to be made available to American schools, not strictly as teaching aids but directed to achieving a broader understanding of science by all students; support of a 4-week summer workshop at the University of Chicago to introduce qualified college students to the field of meteorology as a subject for graduate study and as a profession, and partial support to the American Institute for Research to conduct a planning study for research on the identification, development, and utilization of human talents.

Teacher Training Projects

Teaching is not a static profession in which the education attained in one's youth can serve until retirement. In science, mathematics, and engineering, new developments of a profound nature are constantly occurring and affecting the fundamental principles in important areas of subject matter. Associated with the new discoveries are novel laboratory and demonstration procedures. Today's teacher finds it essenital to seek periodic refresher training, or if necessary, more advanced training, if he expects to retain his competence as a teacher. The problem varies with the teaching level, but this need applies to the professor charged with graduate training, the secondary school teacher, and the elementary school teacher. Whereas the college or university-associated teacher may hunger for recent developments at the frontiers of his field, the precollege teacher is usually isolated from contact with the broad advances in science. Thus, the refresher work required depends on the goals of the participants, and a flexible program is needed to supplement the activities of the regular institutes programs.

During the past year, the National Science Foundation helped various institutions to offer a wide variety of opportunities for the improvement of teachers. Conferences and symposia were supported in such diverse fields as the teaching of astronomy, recent advances in protozoology, approaches to the teaching of "freshman" chemistry, the uses of projection equipment in planetaria, selected problems in statistics, and the use of research problems at the undergraduate level. One example of the needs at a level of education which may require increasing attention was the pilot course given for teachers in technical

institutes in the theory of process instrumentation and automatic control. Another illustration of the productive outcome of a long-standing problem was a workshop centered on the various approaches to improving the electrical engineering curriculum, attended by representatives of 100 engineering schools. The National Science Foundation also contributed support to an important conference on problems of higher education in science and engineering, with the Scientific Manpower Commission, Engineering Manpower Commission, and the National Academy of Sciences-National Research Council as cosponsors. Many national leaders in science, industry, and education attended to discuss the issues on a broad scale, and significant results are expected.

Not only the college teacher has benefited from these projects. In an effort to come to grips with the overwhelming problem of elementary school teachers for science teaching, an exploratory conference by the National Science Teachers Association was supported on this subject. In addition, two experimental approaches were tried in bringing science content closer to the elementary school teacher: one, an in-service institute for all of the interested elementary teachers in a small city; the other, an institute for elementary science teacher-coordinators who were nominated by their schools to receive this training and then return to teach and to coordinate the science programs in their own schools.

Opportunities for secondary school teachers included specialized summer programs in junior high school mathematics, marine biology, and earth science. Of particular interest was a plan used in connection with several mathematics summer institutes. In order to provide the teachers participating in the institutes an opportunity to see new mathematics concepts actually taught in class, or even to try presenting these new ideas themselves, several institutes offered demonstration classes for high school students. The Special Projects in Science Education Program supported these demonstration classes, which seemed not only to help the teachers master the subject but also brought a stimulating experience in mathematics to several hundred superior high school students.

Course Content Improvement Studies

Progress in the sciences has been so rapid in recent years that the courses in science and mathematics offered in most secondary schools now reflect neither the current state of knowledge nor the attitudes of mind which characterize modern scientific study. The course work in mathematics that now makes up the program of most modern high schools has been taught essentially unchanged for approximately 60 years and, therefore, does not emphasize many of the aspects of mathematics

now considered important. Similarly, courses in physics, chemistry, and biology as taught in most secondary schools not only contain much obsolete material, but—even more important—represent a point of view that has long been discarded by the scientists working in these areas. The basic concepts of these sciences have been altered beyond recognition and whole new fields, unknown a few years ago, are now areas in which important and active contributions to knowledge are being made.

Two consequences of this failure of science instruction in the primary and secondary schools to keep pace with the growth of knowledge have been a conspicuous lack of interest in science and mathematics on the part of students and a seriously inadequate preparation for more advanced study in colleges and universities. The quality of the scientific training given our young people has so vital a role for the safety and economic welfare of this country that it can no longer be neglected if America is to maintain its position of leadership in science and technology.

The seriousness of the situation has led many eminent scientists to devote their efforts to a thorough and critical reexamination of science programs in the public schools. The Foundation has provided support for major studies of science curricula in the secondary schools in which the knowledge, judgment, and experience of distinguished scientists and skillful teachers have been welded together to produce new and imaginative approaches to science instruction.

One of the most encouraging activities in high school science instruction today is the development of an entirely new course in physics for the high schools. This has resulted from the cooperative efforts of a large group of senior physicists working with a similar number of experienced and successful high school science teachers. The new course represents a drastic departure from traditional methods of instruction both in selection of subject matter and in the methods of presentation. A new textbook has been written, a new laboratory manual prepared, ingenious and inexpensive equipment has been designed for use in laboratory study, films to supplement class and laboratory instruction are being produced, a large number of monographs extending and enriching the student's understanding of specific topics are being written, and a comprehensive guide to assist teachers in presenting the new course has been prepared. Everything possible has been done to bring maximum appreciation and understanding of the science of physics to the high school student. The new course has been tested in a number of high school classes with most encouraging results, and preparations are now under way to have the course tried in more than 200 classes during the next school year.

A similarly massive study of mathematics curricula in the elementary and secondary schools has been started with Foundation support. Here, also, eminent mathematicians are working cooperatively with experienced high school teachers to develop an approach to mathematics that will both reflect modern concepts in this important field and create interest and understanding in the minds of the students.

Mathematics today is an entirely different discipline from what it was even a generation ago. Its applications have been so extended that scientists in many new fields use it as physicists and engineers used it early in the twentieth century. Industrial employment of mathematicians is many times greater today than was considered probable by the best informed experts of only twenty years ago. The incredible speed with which mathematics has come to play a role in almost every aspect of modern life makes imperative a thorough restudy of the teaching methods whereby young minds are brought into contact with this subject. It is the purpose of the Mathematics Study Group to so reorganize the work in mathematics in the upper levels of the elementary schools and in the high schools that it will become a way of thinking rather than a system of artificial devices to solve problems. Successful advancement of this goal could become one of the important landmarks in the history of educational progress during the twentieth century.

It should be emphasized that these studies have been cooperative efforts in which scientists have sought and obtained the cordial assistance of the professional educational organizations so that the knowledge and experience of both groups could be utilized in the development of the new courses.

Interest in the comprehensive studies of physics and mathematics curricula in the secondary schools has been widespread and has encouraged similar studies in other sciences. The professional scientific societies representing the chemists and biologists have approached the Foundation for the support of comparable studies in these disciplines.

The Foundation provided support for a conference of college teachers of chemistry which was held early in the summer of 1958 at Wesleyan University, Connecticut. The conference discussed both the appropriate materials to be included in college courses in elementary chemistry and the most effective ways of presenting the material to students.

In the area of teaching aids, Foundation support has been given to the production of a series of films in which skillful teachers of mathematics discuss current ideas in special subject-matter areas of mathematics. The films are designed to enlarge and enrich the grasp of mathematics of college students of this discipline.

Support has also been granted for experimental color television films in biology because it is believed that wide-scale use of films and television is a partial answer to increasing enrollments, shortages of teachers, and presentation of educational experiences difficult to provide in other ways. This project enlists, under the sponsorship of the American Institute of Biological Sciences, distinguished biologists and experienced production personnel in presenting both factual and theoretical topics on film, together with an evaluation of the effectiveness of this type of teaching.

Scientific Manpower Program

The Scientific Manpower Program is designed to provide the Federal Government with knowledge about the Nation's resources of scientific manpower, such as supply, demand, utilization, and characteristics. This is accomplished through maintenance of the National Register of Scientific and Technical Personnel and through the conduct of Scientific Manpower Studies. Expenditures for this program during 1958 totaled approximately $352,000.

The National Register of Scientific and Technical Personnel

The Register provides a means for quickly locating specialized scientific manpower in case of emergency and serves as a source of data concerning scientific manpower supply and characteristics. It is maintained by the Foundation in cooperation with the Nation's professional organizations of scientists and engineers. At present the Register lists more than 175,000 names, an increase of over 25,000 during the year.

During 1958, an analysis was completed of data received during 1954–55 from 126,000 scientists. The reports are currently being processed. The data deal with a wide variety of factors, such as salary, age, level of education, field of study, professional specialization, function, and type of employer. In addition, special studies are being made of the proficiency of scientists in various foreign languages.

A "Survey of Earned Doctorates" is proceeding under grant to the National Academy of Sciences-National Research Council. The object is to collect information by means of specially designed questionnaires from all individuals now being granted science or technical doctorates, as a continuing program. Statistical analyses are aready under way.

Register personnel have been cooperating with the Civil Service Commission in the establishment of a special placement roster of Federal scientists and engineers in grades GS–13 and above. (The starting salary for GS–13 is $9,890.) This roster is expected to be in operation in the fall of 1958.

During the past year the Register has been used to provide data on mathematicians in certain specialties to the Bureau of the Budget; salaries of scientists to the Civil Service Commission; resident scientists to the State of Florida; older scientists to the National Committee on Aging; etc.

FUTURE PLANS.—To place the Register program on a more current operating basis and extend the coverage of the Register to new fields of vital importance to the Nation, such as rocket and missile technology, communications and electronics, aeronautical science, ceramics and metallurgy. Methods of increasing the usefulness of the data currently within the Register are also under study.

Scientific Manpower Studies

This program acts as a clearinghouse for the collection, interpretation, and dissemination of information concerning scientific and technical personnel.

During fiscal year 1958, at the request of the Bureau of the Budget, a major study was initiated by the Foundation aimed at the development of a coordinated program of scientific manpower data collection. An advisory panel consisting of experts in the field was appointed jointly by the Foundation and the President's Committee on Scientists and Engineers, under the chairmanship of Dr. Philip M. Hauser of the University of Chicago.

The results of this panel's study served as the basis of the Foundation's report to the Bureau of the Budget, "A Program for National Information on Scientific and Technical Personnel." The Foundation indicated the many gaps now existing in scientific manpower information and the need for better planning and coordination in the operation of existing data collection programs. Among the report's recommendations for urgent action, three general areas of need are most urgent: (a) better definitions and classification of scientific and technical manpower; (b) a continuing flow of basic employment information; and (c) projections. Other recommendations include intensive surveys of scientific manpower characteristics, improvement of data collection on education, and studies of qualitative aspects of scientific and technical manpower. A key recommendation is that an appropriate Federal agency should be given the responsibility for coordinating that part of the work which involves Government support for analyzing the data produced and for making the findings known.

The Foundation in cooperation with the Engineers Joint Council, the National Academy of Sciences-National Research Council, and the Scientific Manpower Commission sponsored the Conference on Higher

Education and Technology held in Chicago, Illinois, October 31–November 2, 1957. The Western Society of Engineers was the local sponsor. The immediate objectives of the conference were to: (a) provide an up-to-date picture of the scientific and engineering manpower situation and its implications for educational resources; (b) highlight the unique problems of higher education in science and engineering and explore remedial measures; and (c) contribute to the general understanding of problems of higher education in technology and the need to rally our Nation's resources to meet the challenge. The proceedings of the conference were published under the title *Engineering and Scientific Education—Foundation of National Strength.*

During the fiscal year 1958, the following studies were completed:

Immigration of Professional Workers to the United States, 1953–56.—An analysis of approximately 60,000 immigrants, classified as professional, technical, and kindred workers, who entered the U. S. for permanent residence during fiscal years 1953–56 (July 1, 1952–June 30, 1956).

Scientific Manpower–1957.—The papers presented at the Sixth Conference on Scientific Manpower held in conjunction with the AAAS meeting at Indianapolis, Ind., in December 1957. The conference theme was "Scientists and Scientific Research in a Changing Economy."

Reports prepared as a result of Foundation grants include *Engineering Enrollment and Faculty Requirements, 1957 to 1967; Availability of Retired Officers to Teach Mathematics and Science;* and *Doctorate Production in United States Universities, 1936–56.*

Other projects included analysis of data for 1954–55 from the National Register of Scientific and Technical Personnel; analysis of data from the 1957 Survey of Doctorate Degrees; continuing analysis of information on scientific manpower in foreign countries; and special research on various subjects in the field of education, such as high school—college attrition and qualifications and preparation of high school science and mathematics teachers.

FUTURE PLANS.—To enlarge the program so as to begin to adopt urgent recommendations which have been made concerning an integrated and expanded program of scientific manpower data collection, to expand the analysis of the relative scientific manpower positions of the Free World and the Soviet Bloc nations, and to initiate a program of experimental research on scientific manpower data collection.

EXCHANGE OF SCIENTIFIC INFORMATION

The ultimate goal of the Office of Scientific Information is to insure the ready availability to all United States scientists of the world's current and past output of significant scientific information. With the ever-increasing volume of scientific research throughout the world has come a proportionate increase in the body of the world's scientific knowledge. These factors pose a severe problem in dissemination, for research, no matter how significant, is of little value unless the results are easily accessible to other scientists.

The Foundation, through the Office of Scientific Information, fosters cooperation and coordination of scientific information activities among agencies of the Federal Government and among non-Government organizations engaged in activities in this field.

The four major programs of this Office are: *Research on Scientific Information, Publications and Information Services, Government Research Information, Foreign Science Information.* During fiscal year 1958, approximately $2 million were spent in pursuit of these programs.

Research on Scientific Information

The objective of this program is the development of new or improved means of organizing, translating, storing, searching for, and disseminating large quantities of scientific information. Scientists need new tools to help them find and digest the material they want without time-consuming searches through the literature. The design of improved systems and the development of procedures for using high-speed machines in the processing of scientific information require thorough study of the actual information requirements of scientists, experimentation with possible ways of organizing and searching information so as to best meet their requirements, and, finally, testing and evaluation of proposed new procedures and systems.

Machine Translation

Active research programs on the use of electronic machines in preparing translations are being carried on in the U. S. S. R. and England,

as well as in the United States. The 71 technical papers presented at a 6-day conference in Moscow in May 1958 on research in mechanical translation demonstrate the size of the Russian effort.

The Foundation is continuing its support of the following programs in this field. The Massachusetts Institute of Technology is continuing work on methods of machine translation with emphasis on the study of sentence structure in German and English and procedures for converting German sentences into the correct English word order. At Georgetown University research continues on translation of Russian chemical papers into English. Several promising techniques which have been developed are being tested on general-purpose computers.

At the Harvard Computation Laboratory a full-scale automatic Russian-to-English "electronics dictionary" will soon be in operation, and will be used as a research tool in the continuing program to develop rules for the fully automatic production of translations.

The Cambridge Language Research Unit, Cambridge, England, is continuing work on the development of generalized procedures for handling syntactic structures and semantic choices in machine translation. The procedures are being tested first on punched cards.

Organizing and Locating Information

Several new studies have been started and others continued dealing with problems involved in organizing and locating information. A study of the use of a computer to prepare a coordinate index for bibliographies in book form was begun at George Washington University. Western Reserve University has undertaken a test program of chemical notation systems, which in time may be used to facilitate the preparation of indices and the use of machines in searching chemical structure files. A basic research project looking toward a systematic means of reducing the linguistic complexities of scientific publications to simpler, more uniform construction is in its second year at the University of Pennsylvania.

Operations Research Studies of Scientific Communication

Continuing support was given to an exploratory operations research study of scientific communication at the Case Institute of Technology. This project is a pilot study of the pattern of communication among chemists and their use of recorded information. A final report was received from a related study, based on interview survey methods, of scientific information exchange at Columbia University. The report discusses the occasions of information exchange and the characteristics of information-gathering patterns in a university environment and sug-

gests additional studies looking toward the improvement of channels of information exchange.

Research Information Center and Advisory Service

The Foundation called a series of conferences and meetings with directors of research and representatives of other Federal agencies to discuss means of facilitating research on information processing and searching, as well as on machine translation. As a result of these discussions, plans were made for the establishment at the National Bureau of Standards of a research information center and advisory service in the field of information processing (including machine translation), whose services will be available to Federal agencies and other organizations conducting or supporting research in the field. The new service is expected to be in operation early in fiscal year 1959.

International Conference on Scientific Information

Both financial assistance and staff time were given to the planning of a large international research conference on scientific information, to be held in Washington, D. C., late in 1958 under the auspices of the National Academy of Sciences—National Research Council, the American Documentation Institute, and the National Science Foundation. Approximately 75 papers have been accepted for the conference.

Publications and Information Services

The principal objective of this program is to aid the dissemination of scientific information by helping to maintain, improve, and expand present means of publication, and by helping to establish and maintain information centers that provide scientists with specialized reference services, where such aid is necessary.

Support of Scientific Publications

As in the past, the Foundation granted temporary, emergency support to valuable research journals facing financial or other crises (such as the *Astronomical Journal*), or to help journals with a specific problem such as the publication of an extensive backlog or a cumulative index (such as the *Journal of Parasitology*). Support was also given to help defray the publication costs, and sometimes part of the preparation costs, of other types of significant publications that could not be published without such aid. These included monographs (such as *World Monograph on*

the Fontinalaceae), specialized bibliographies (continuation of a bibliography of the International Geophysical Year), compilations of data (*Organic Electronic Spectral Data, 1946–55*), volumes of special tables (*Geographical Conversion Tables*), and critical reviews of recent developments in a field (a comprehensive volume of reviews on all aspects of phytopathology by leading experts from all over the world).

Abstracting and Indexing Services

Special attention was given this year to the problems of abstracting and indexing services. Besides giving emergency support to *Mathematical Reviews* and *Sociological Abstracts,* the Foundation provided funds and staff work for a conference of major United States scientific abstracting and indexing services. The conference met to consider operating problems of the services and to explore the possibility of increased cooperation among the various services to achieve systematic coverage of the world's scientific literature. A major accomplishment of the conference was the formation of the National Federation of Science Abstracting and Indexing Services, which will strive to coordinate the work of the various services, seek ways to improve them, and encourage the development of abstracting and indexing services for those specialized subject fields not at present covered by such services.

Data and Reference Centers

Support was given for the establishment of an Office of Critical Tables at the National Academy of Sciences—National Research Council to coordinate the activities of the various data compilation projects now in progress in this country and of the data centers currently in operation, and to stimulate new projects and centers in areas not presently being covered. The Foundation again joined with other Federal agencies to support the Bio-Sciences Information Exchange, which collects information on current research projects in the biological sciences, organizes and classifies this information, and makes it available upon request.

Studies and Experiments

Several studies were undertaken, under grants from this program, of problems connected with publishing and disseminating scientific information. The American Institute of Physics began a major program of research on publishing problems in the field of physics, including such matters as the nature of the problems, comparisons of techniques and methods that might be used in physics, publications, and the pub-

lication needs and uses of physicists. *Biological Abstracts* undertook a survey of the coverage of botanical literature by abstracting services. Herner and Company made a study of the importance of subject slanting in published abstracts, where the same papers are abstracted for scientists in different fields.

Support was given to the Conference of Biological Editors for the preparation of a style manual for biological publications, which will establish standards in such matters as literature citations, terminology, abbreviations, and preparation of illustrations. These standards will be arrived at by agreements among biological editors, and it is expected that most biological journals will adhere to them after the manual is published, thus establishing badly needed consistency and saving considerable time and effort of both editors and authors.

The American Physical Society was given partial support for the establishment of an experimental type of journal for the rapid publication of physics research results. New editorial procedures will be used, and it is hoped that improved production methods will also be developed. The results of the experiment will be watched with great interest by other scientific groups.

Government Research Information

The objective of the Government Research Information program is to make unpublished results of federally supported scientific research as available to United States scientists as are the results published conventionally in journals and books.

Inventory of Government Scientific Reporting

An inventory of Government agencies has been underway to determine the quantity and subject matter of the scientific reports which they issue, the availability of these reports to scientists outside Government, and the policies and procedures of these agencies with respect to their scientific information programs. Additional agencies were surveyed during fiscal year 1958, and the data from the entire survey will be published in a series of Foundation pamphlets. The first, dealing with the Department of Agriculture, will appear early in fiscal year 1959.

Government Research Information Clearinghouse

The second year of operation of the GRI Clearinghouse saw an increase in the comprehensiveness of replies to inquiries from scientists. More than 9,000 information sources were cited in response to requests

by scientists for information on where Government-sponsored research is being carried on and how access to the resultant reports can be obtained.

Clearinghouse staff members, in a prototype declassification program, are searching the Armed Services Technical Information Agency's classified collection for significant reports that appear to be susceptible of declassification. Subjects are selected on the basis of interest as expressed by queries directed to the Clearinghouse. Declassification recommendations are handled by the Office of Technical Services.

Office of Technical Services, U. S. Department of Commerce

Financial support of the Office of Technical Services was increased to enable it to continue and expand its vigorous program of obtaining, announcing, and making generally available scientific reports in basic research fields. As a result, OTS was able substantially to augment its automatic acquisition agreements with other Federal agencies and now believes it is receiving nearly all significant, unclassified reports in basic science issued by the Department of Defense and its contractors.

Library of Congress

The Report Reference Center, established in the Library's Science Division in fiscal year 1957, increased its work as a result of an increase in the funds granted to it, and now has the country's principal collection of unclassified scientific reports available for general reference use. About 40,000 titles were added during the fiscal year, bringing the total to approximately 100,000.

With Foundation support the Library will complete early in fiscal year 1959 its preparation of the Armed Services Technical Information Agency subject index to the unclassified reports within AD numbers 1 to 75,000.

Foreign Science Information

The basic goal of this program is the widest possible dissemination in the United States of the published results of foreign scientific research. To date it has been necessary to limit work toward this goal almost exclusively to Russian scientific literature, emphasizing translations into English.

Midwest Inter-Library Center (MILC)

Continued support was given to the MILC in Chicago, a cooperative endeavor of 19 major midwestern universities. The Center is establish-

ing a comprehensive collection of foreign chemical and biological serial publications. The Foundation grant for fiscal year 1958 will maintain the subscriptions to the 800 journals acquired last year and permit the addition of 1,000 in chemistry and 500 in biology. When present gaps are filled, the holdings will make 9,500 of the world's most significant serials in these two fields available to U. S. scientists.

Translations of Russian Documents

Grants made during the year brought to 29 the number of Russian scientific journals receiving cover-to-cover translation with Foundation support and with the cooperation of the Atomic Energy Commission, the National Bureau of Standards, and the Office of Naval Research; 14 new translation projects were begun during the year. These together with translations sponsored commercially and by other agencies make available in English by subscription more than 50 important Russian scientific periodicals. Grants were also made for the translation of 10 important Russian scientific monographs in the fields of biology, ceramics, geochemistry, geology, and mathematics. Support was granted for the fifth consecutive year for translation by the American Mathematical Society of approximately 1,500 pages of carefully selected papers from Russian mathematics journals.

Special Libraries Association Translation Center

In collaboration with the National Institutes of Health, the Foundation continued to support the Special Libraries Association Translation Center of the John Crerar Library in Chicago. The Center's holdings were increased during the year to approximately 20,000 titles. New titles are being added at the rate of about 500 per month.

Foreign Technical Information Center

In line with its efforts to assist agencies of Government to coordinate foreign information programs for maximum effectiveness, the Foundation chaired a series of interagency meetings to plan methods for disseminating Government-prepared translations to the public. Out of these meetings grew a new program which the Congress has authorized to be established within the Office of Technical Services of the Department of Commerce. The primary function of the new Foreign Technical Information Center, to begin operation in fiscal year 1959, will be to act as a clearinghouse and to channel to the public large quantities of abstracts, translations, and studies of foreign science prepared by a number of Government agencies in the course of their normal operations.

Other grants during the year included support for a supplement to *Bibliography of Eastern Asiatic Botany,* a study of the current status of Russian biological research publications and another on certain Russian engineering publications, and preparation and publication of *A Selected Bibliography of Japanese Publications in Science and Technology.* Continued partial support was given to the International Council of Scientific Unions for its program of assisting international cooperation in scientific abstracting.

Special Scientific Exhibits

In 1957–58 the Foundation coordinated the United States program for large-scale science exhibits in the International Science Section of the Brussels World's Fair. Funds transferred from the Department of State paid for the conception, design, construction, and display of approximately 6,000 square feet of exhibits. The United States is represented by 51 displays of a total of about 500 from 15 nations.

The scientific achievements of more than 100 prominent American scientists, combined with cooperation and generous assistance from 50 American industries, contributed to the production of the United States exhibits. American exhibits range from the very popular to the very technical, and include a display of manmade diamonds, an operating nuclear reactor, and an exhibit on the recent Nobel prize-winning discovery of the nonconservation of parity.

With the cooperation of the Naval Research Laboratory and the National Academy of Sciences-National Research Council, 4 outstanding earth satellite exhibits were produced, which have been shown a total of 61 times in 25 States, the District of Columbia, and 3 foreign countries, as well as having had 4 television appearances. These exhibits are currently being modified to include the Explorer satellite as well as Vanguard.

SURVEYS OF THE NATIONAL RESEARCH AND DEVELOPMENT EFFORT

The vastly increased public attention given to basic science, following the launching of the Soviet sputniks, made apparent the need for more information on the present research and development efforts in the United States. Fortunately, factfinding in this area had been part of the program of the National Science Foundation for several years. Early studies provided much otherwise unavailable information. This year the Foundation accelerated the development of a long-range plan for obtaining annual data on the volume of research and development.

To carry out this program, the Foundation's Office of Special Studies was reorganized. Four program objectives were outlined to collect and analyze data on the nature and extent of the Nation's scientific activities, and thereby assist in the formulation of Federal science policies. These program objectives are as follows:

1. To measure the Nation's research and development effort.
2. To undertake such special studies as may be indicated by the analysis of the results under (1), in order to throw additional light on the problems involved.
3. To appraise the impact of research and development on selected areas as well as the economy as a whole.
4. To promulgate the findings in a series of monographs and reports.

Long-range statistical studies on research and development in four sectors of the economy are now materializing. On an annual basis data are being collected on the Federal sector; in the other three sectors—private industry, colleges and universities, and other nonprofit institutions—periodic benchmark surveys are planned with intervening annual summary surveys. The continuity of these surveys will make possible time series for the individual sectors as well as for the national totals, with accompanying analyses on the flow of funds.

Work has begun on analytical studies, including examination of the relationship of research and development to the growth of a company, and investigation of decision-making as related to innovation and to research and development expenditures. Still another will survey the trends and volume of scientific research and development expenditures

and manpower in the Soviet Union. Plans are also being made to develop special studies in the colleges and universities area and in the Federal Government sector.

During the year, the publications issued by the Foundation in this field were as follows:

Government

Two studies of Federal scientific activity and one on scientific activity in six State governments were released during the year. These studies, along with brief comments on their findings, are noted below.

Federal Funds for Science VI. The Federal Research and Development Budget, Fiscal Years 1956, 1957, and 1958.—This issue of the *Federal Funds for Science* series continued the annual analysis of the Federal Government's obligations and expenditures for scientific research and development. As shown in figure 2, both obligations and expenditures for this purpose increased in the three fiscal years covered by the study.

These obligations and expenditures represent the funds administered by more than 20 Federal agencies for basic research, applied research, development, and the expansion of R&D plant which accounted for 10–15 percent of the totals shown in figure 2. Of the Government's total obligations for basic and applied research and development, more than 60 percent is for development and less than 40 percent is for research, including basic research.

The Federal research and development budget, which has shown a multifold increase since 1940, includes funds for work conducted not only in Government laboratories but under contract or grant arrangements with numerous private organizations, such as industry and educational and other nonprofit organizations.

In the past decade Federal expenditures for scientific research and development have advanced from around 2 percent of the total Federal budget to more than 4 percent.

Funds for Scientific Activities in the Federal Government.—Along with a number of surveys of research and development initiated in 1954, a study of the Federal Government's organization, personnel, and funds for scientific activities was undertaken. Previous publications have summarized the information developed on organization and personnel. This publication focused on Government funds applied to a wide range of scientific activities, including, in addition to conduct of research and development, amounts for planning and administering R&D, increase of R&D plant, scientific data collection, training of scientific manpower, and scientific information. Since more than 80 percent of the total

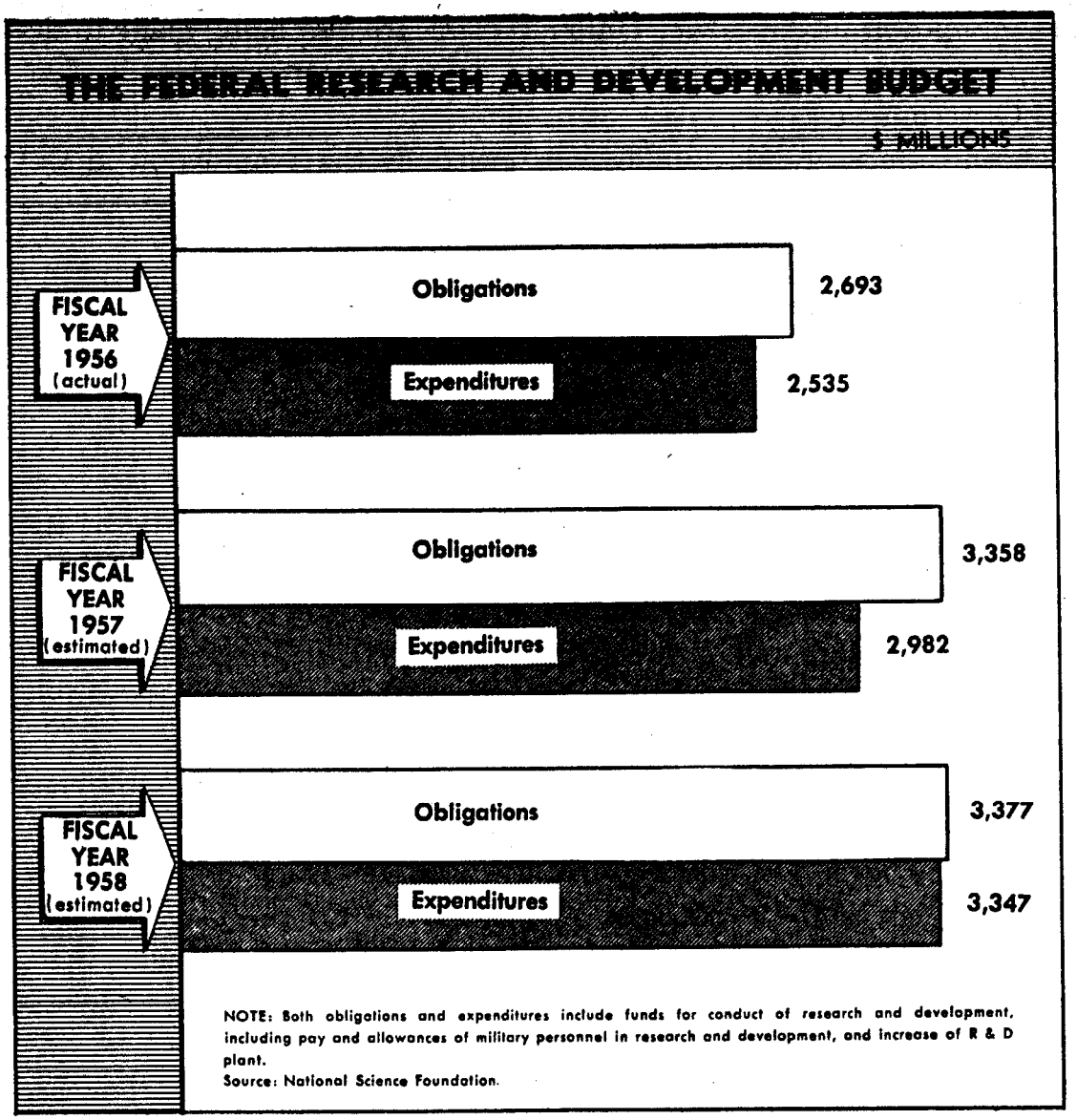


Figure 2.—*The Federal research and development budget, fiscal years 1956–58.*

funds for scientific activities was applied to conduct of research and development in fiscal year 1954, the major emphasis in the publication is on this activity.

Scientific Activities in Six State Governments.—In addition to the survey of scientific activities in the Federal Government, an exploratory study of such activities in six selected States was initiated during the same period and a summary of the findings was published.

The combined expenditures of California, Connecticut, New Mexico, New York, North Carolina, and Wisconsin for scientific activities amounted to $69 million out of a total of $4.3 billion for all purposes in fiscal year 1954. As shown in the accompanying table, conduct of research and development accounted for $57 million of the total scientific activity expenditures. Almost two-thirds of the funds for research and development were expended for such purposes in the Agricultural Experiment Stations and the State universities.

Expenditures for Conduct of Research and Development in the Six States, by Functional Areas, Fiscal Year 1954

[Dollar amounts in thousands]

Functional area	Total	California	Connecticut	New Mexico	New York	North Carolina	Wisconsin
Total	$57,007	$29,892	$1,926	$1,425	$13,795	$4,425	$5,544
Agriculture, total	20,584	9,938	971	419	4,078	2,333	2,845
(Agricultural experiment stations)	(19,195)	(9,293)	(971)	(416)	(4,022)	(1,648)	(2,845)
State universities [1]	16,782	10,725	467	319	1,405	1,586	2,280
Other education	506	42	36	67	309	52	.....
Health and welfare	[2] 8,381	1,778	174	23	6,320	23	63
Resource development and public works	7,675	[3] 5,724	208	550	471	406	316
Fiscal and administrative control	397	155	20	.....	214	8	.....
Legislative and judicial agencies	1,327	[4] 923	42	24	313	.....	25
Public safety	77	52	8	.....	.....	17	.....
Business, labor, and vocational licensing	1,278	555	.....	23	685	.....	15

[1] State universities include colleges of agriculture.

[2] All of this total except $770,000 went for research and development in the field of health.

[3] This total represents $2,580,000 for research in public works and the remainder in "resource development," e. g., such as that performed by the department of fish and game, which received $1,540,000.

[4] Of this total, $923,000 went largely for applied social science, such as work by interim commissions to study legislative and judicial problems.

Source: National Science Foundation.

Colleges and Universities and Other Nonprofit Institutions

Several reports, offering insight into research and development within these institutions, were published during the year. These studies, based on previous surveys, are enumerated below.

Faculty Scientific Research Activities at Colleges and Universities, 1953–54 (Reviews of Data on Research & Development, No. 6).—This survey covered 1,120 institutions. Detailed data were reported by 180 schools out of the 190 which had large research programs. The remaining 807 responding institutions were primarily liberal arts and teacher colleges.

The survey showed that the preponderance of total academic research effort is carried on in the large complex institutions—those having schools of medicine, agriculture, and engineering. The 180 large institutions reported total faculty of 46,560, of whom 30,060 were engaged in research; the 807 small institutions reported total faculty of 15,691, of whom 1,359 were engaged in research.

The greatest number of faculty members and full-time equivalents (*i. e.,* estimated equivalent of full-time faculty work performed by part-time faculty) engaged in research were in the life sciences, reflecting the large amount of medical research in academic institutions. The next greatest number were in the physical sciences, of which the largest number were in engineering fields.

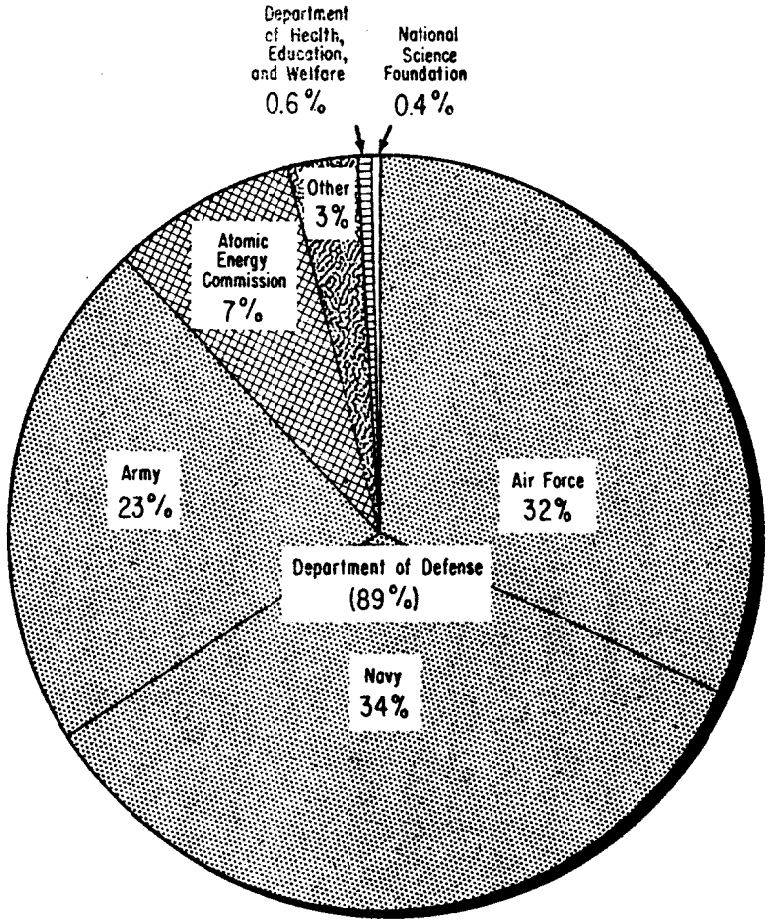
Funds for Research and Development at Engineering Schools, 1953–54 (Reviews of Data on Research & Development, No. 7).—The 109 engineering schools submitting usable returns in this survey conferred 92 percent of all graduate degrees in engineering in the United States during the period covered by the survey, July 1, 1953 to June 30, 1954.

The estimated total research funds spent by these schools during the year was $72.8 million. Approximately $64.4 million, or 88 percent, of this was separately budgeted for research; the remainder was for departmental research and indirect costs of separately budgeted funds.

Of considerable interest is the fact that more than four-fifths of the funds for separately budgeted research in engineering schools, $53.7 million, came from the Federal Government. Most of this was from the Department of Defense. (See figures 3 and 4.)

Funds for Research in Agricultural Experiment Stations, 1953–54 (Review of Data on Research & Development, No. 8)—This survey covered the 53 agricultural experiment stations in the United States, Alaska, Puerto Rico, and Hawaii which received Federal grants-in-aid for research.

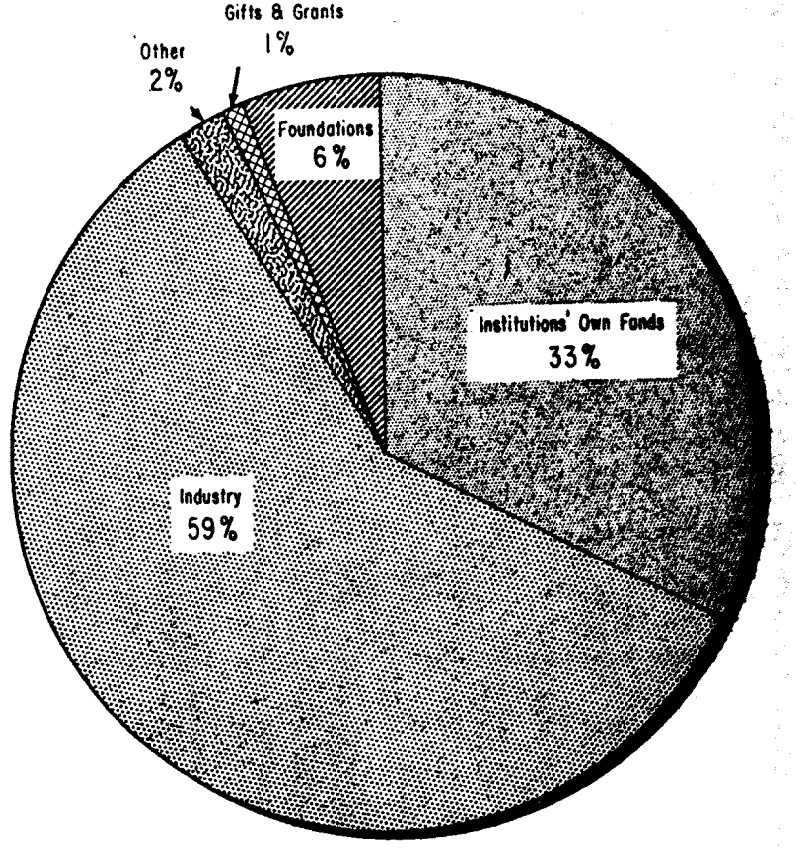
FEDERAL SOURCES—53.7 MILLION



SOURCE: National Science Foundation

Figure 3.—*Percent distribution of Federal expenditure for separately budgeted engineer-school research, by agency, 1953–54.*

NON-FEDERAL SOURCES—10.7 MILLION



SOURCE: National Science Foundation

Figure 4—*Percent distribution of non-Federal expenditures for separately budgeted engineering-school research, by source, 1953–54.*

Total Number and Full-Time Equivalents of Faculty in Scientific Research Activities, by Field, Academic Year 1953–54 (987 Institutions)

Field	Number in research		Percent distribution	
	Total (1)	Full-time equivalent (2)	Total (3)	Full-time equivalent (4)
Physical sciences	10,450	5,481	33	33
Engineering sciences	4,168	2,281	13	14
Chemistry	2,179	1,077	7	7
Physics	1,517	837	5	5
Mathematics	1,214	564	4	3
All other physical sciences	1,372	722	4	4
Life sciences	11,332	5,679	36	34
Biological sciences including medical preclinical	6,560	3,508	21	21
Clinical sciences	4,772	2,171	15	13
Agricultural sciences	5,139	3,658	16	22
Psychology	986	389	3	2
Social sciences	3,548	1,327	11	8
Total	31,455	16,534	100	100

NOTE.—Detail will not necessarily add to totals because of rounding.
Source: National Science Foundation.

Unlike the research in colleges and universities, the greatest amount of effort in agricultural institutions was for applied research. The academic institutions had reported that 62 percent of their research was basic, while these stations reported only 23 percent as basic. However, some of the land-grant universities may have had a relatively high percent of their basic research conducted by the agricultural experiment stations.

Primary source of support for the agricultural experiment stations comes not from the Federal Government, but from the States. The U. S. Department of Agriculture contributed $13.5 million for the year, while State governments contributed $44.9. However, the Federal

funds provided to these stations constitute the nucleus of their support and the incentive for State and private support of agricultural research. Funds from all other sources, such as sales, industry and foundation contributions, and others, came to $15.8 million.

Research Expenditures of Foundations and Other Nonprofit Institutions, 1953–54.—Included in this report are a diverse group of nonprofit organizations such as private philanthropic foundations, health agencies, research institutes, professional societies, academies of science, science museums, and botanical and zoological gardens. These organizations, which accounted for expenditures of approximately $70 million for scientific research and development, play an important and, in some respects, a unique role in the Nation's scientific community.

Industry

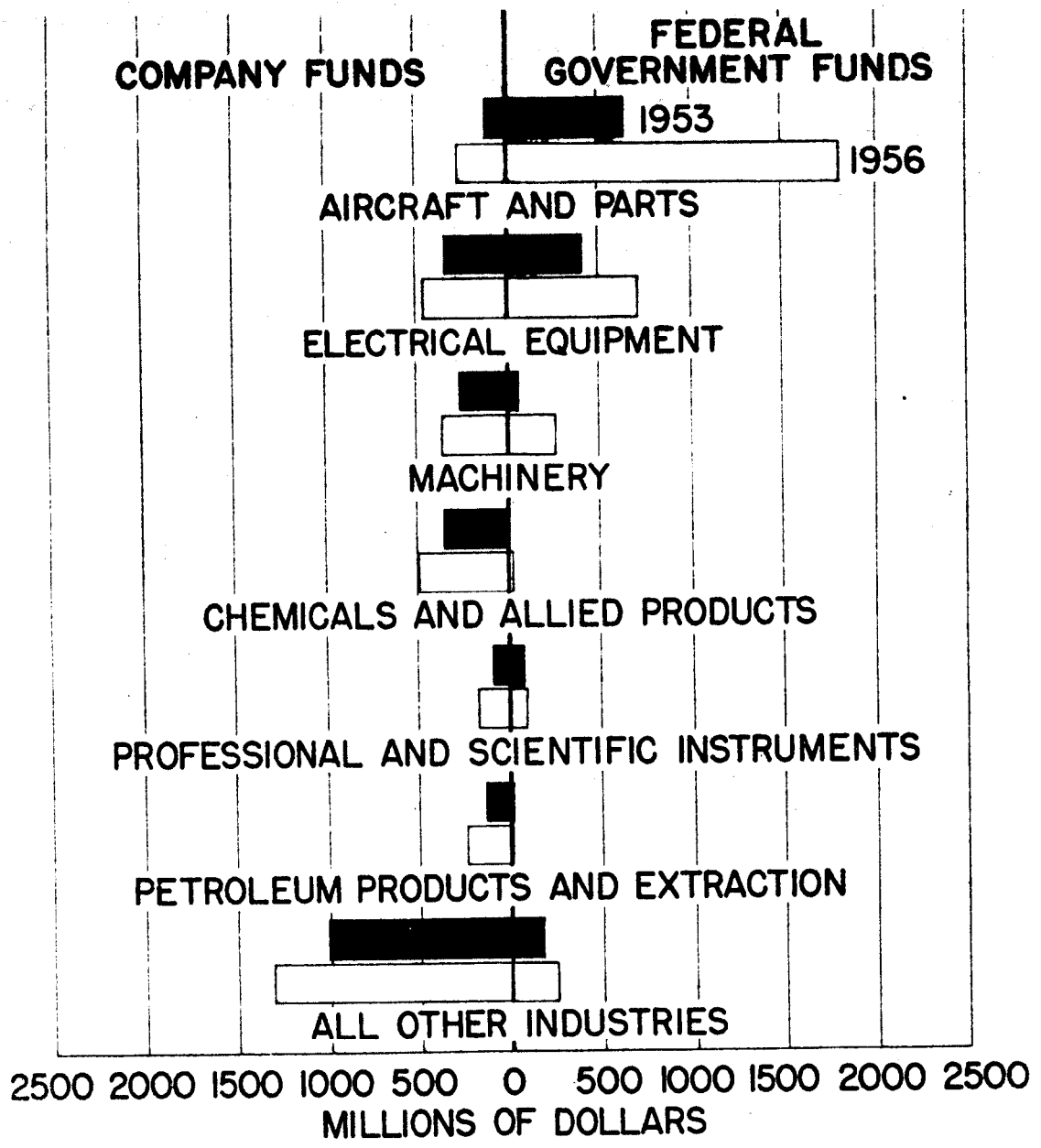
Two publications which dealt with research and development in the industrial sector were issued during the year.

Research and Development Costs in American Industry, 1956.—A preliminary report of research and development costs in American Industry in 1956 was issued by the Foundation in *Reviews of Data on Research and Development, No. 10.* The study was conducted by the Bureau of Labor Statistics and was based on a stratified random sample of manufacturing and most other nonagricultural industries. Commercial laboratories and trade associations were the subject of a separate survey.

Compared with 1953, the date of an earlier study, industrial research and development costs showed a 76 percent rise, from $3.7 billion to $6.5 billion in 1956. Federal Government-financed work accounted for $1.8 billion of the increase, while privately financed work accounted for the remaining $1.0 billion. Of total industrial research and development funds, the federally supported proportion rose from 37 percent to 49 percent.

Four major industries accounted for 68 percent of all research and development expenditures in 1956—aircraft and parts, electrical equipment, machinery, and chemicals and allied products. Aircraft and parts and electrical equipment alone accounted for just over 50 percent of total research and development costs. (See figure 5.)

INDUSTRIAL RESEARCH AND DEVELOPMENT FUNDS IN THE UNITED STATES, BY SOURCE AND BY INDUSTRY, 1953 AND 1956 [1]



1/DATA FOR 1956 ARE PRELIMINARY. DATA FOR EACH YEAR ARE EXPRESSED IN CURRENT DOLLAR TERMS.

SOURCE: NATIONAL SCIENCE FOUNDATION, OFFICE OF SPECIAL STUDIES, BASED ON DATA COMPILED BY BUREAU OF LABOR STATISTICS.

Figure 5.—*Industrial research and development funds in the United States, by source and by industry, 1953 and 1956.*

The largest increase in research and development occurred in aircraft and parts industry, which rose 174 percent, from $758.0 million in 1953 to $2,078.7 million in 1956. The machinery industry was next in line with a 92 percent increase, from $318.9 million in 1953 to $610.6 million in 1956. As for the electrical equipment industry, it increased 58 percent, from $743.3 million in 1953 to $1,173.4 million in 1956. Growth in the chemicals and allied products industry amounted to 42

percent, increasing from $361.1 million in 1953 to $511.7 million in 1956. Expansion in research and development costs from 1953 to 1956 ranged between 70 percent and 75 percent for fabricated metal products and ordnance, petroleum products and extraction, and stone, clay, and glass products. In the lower 50 percent to 60 percent range were to be found telecommunications and broadcasting, rubber products, and professional and scientific instruments.

Four-fifths of total Federal funds for industrial research and development in 1956 went into the aircraft and parts and the electrical equipment industries. In the aircraft and parts industry, 87 percent of their total funds were derived from the Federal Government, and in the electrical equipment industry, 54 percent was the comparable figure. By contrast, in chemicals and allied products, only $13.3 million or 2.6 percent came from the Federal Government. As figure 5 indicates, the role of Federal Government financing is expanding for the three leading industries receiving Federal Government funds—aircraft and parts, electrical equipment, and machinery.

Directory of Independent Commercial Laboratories Performing Research and Development, 1957.—This is the most recent available listing of such laboratories and was compiled by Syracuse University under Foundation contract.

Number*[1] *of Scientists and Engineers Engaged in Research and Development by Sector and Occupational Field, 1954

Major sector	Physical sciences and engineering			Life sciences	Natural sciences total
	Physical sciences	Engineering	Total		
Federal Government[2]	13,800	16,700	30,500	4,800	35,300
Industry-oriented organizations[3]	45,700	116,600	162,300	4,200	166,500
Colleges and universities[3]	7,600	5,600	13,200	12,000	25,200
Other institutions[3]	700	300	1,000	1,000	2,000
Total	67,800	139,200	207,000	22,000	229,000

[1] For the most part these data consist of numbers of full-time personnel plus the full-time equivalent of personnel engaged part time in research.

[2] Includes military personnel.

[3] Includes research personnel employed at research centers administered by organizations in this sector under contract with Federal agencies.

Source: National Science Foundation.

Overall Data

A synthesis of previous survey data on scientific personnel was released during fiscal year 1958.

Scientists and Engineers in Research and Development, 1954.—Summary data on employed scientists and engineers in the conduct of research and development in the natural sciences (including engineering) in the United States were presented in the ninth issue of *Reviews of Data on Research & Development.* According to this summary, based on a number of surveys conducted in 1954, approximately 230,000 scientists and engineers were engaged in R&D activities. The following table shows a distribution of these people on the basis of their occupational fields and the major sectors of employment.

Conference on Research and Development and Its Impact on the Economy

The increase in research and development expenditures from $5.4 billion in 1953 to an estimated $10 billion in 1957 has sharpened the need for knowledge of research and development as an economic factor. To marshal such knowledge by virtue of its responsibility under Public Law 507, 81st Congress, "to appraise the impact of research upon industrial development and upon the general welfare," the Foundation called a conference on "Research and Development and Its Impact on the Economy," held May 20, 1958. More than 500 noted economists and spokesmen for science attended.

The continuing themes of the conference, as Dr. Alan T. Waterman saw them, were the interrelationship of natural science research with the state of knowledge in economics and social sciences, the interdependence of basic and of applied research, and the interdependence of government, industry, and universities and other nonprofit institutions in furthering research and development.

Scientific Research and the State of the Economy

Many conference speakers emphasized that research is not only a good investment, but is in time of recession indispensable. Professor Sumner H. Slichter, Lamont Professor of Economics, Harvard University, outlined in detail his thesis of research as a dynamic force in a free competitive society.

"Within the last thirty years," Professor Slichter stated, "technological research has become a large activity that introduces fundamental changes into the operation of the economy. Measured in terms of the number of scientists and engineers devoting full time to it, re-

search "is more than five times as large as it was in 1930, and measured by the ratio of research expenditures to the gross national product, it is about thirteen times as large. * * * Today it is unthinkable that anyone should attempt to construct a theory of employment or a theory of growth without taking account of technological research."

Research for profit he calls "the industry of discovery," whose "product is knowledge." Because the product is knowledge, its utility does not diminish as the supply increases, but rather increases as it combines with the output of other units of the industry.

"One may think of knowledge as consisting of a body of tested propositions," Dr. Slichter explained. "The larger the number of tested propositions, the more numerous are the cases in which the addition of a new tested proposition will yield new useful applications and, in addition, will suggest hypotheses useful in adding still more tested propositions to the body of knowledge. Thus, the greater the body of existing knowledge, the greater is likely to be the value of the new discoveries. * * *

"It is obvious that technological research increases the capacity of the economy to raise productivity. Less obvious and indeed generally overlooked is the fact that research gives the economy the capacity to bring about planned increases in the demand for goods—both by creating new demands for consumption goods and by creating new investment opportunities. * * *"

Research, he said, tends to introduce into industry the sort of technology that must be financed by long-range plans outside the business cycle. Furthermore, technological research greatly increases the number of industries in the economy and this, in itself, is a stabilizing influence. "Hence, * * * technological research tends to moderate the cyclical movements of the economy as a whole."

The remarks of Dr. Dexter Keezer of the McGraw-Hill Publishing Company confirmed Professor Slichter's thesis. He stated, "There is no recession in research and development. * * * Industry plans to spend billions of dollars more this year for research and development than it spent last year. Expenditure indicated is over $8 billion."

Relationship of Research Process to Research Resources

Several speakers emphasized that growth of our economy requires nurturing the roots of research and development. Dr. James R. Killian, Jr., Special Assistant to the President for Science and Technology, said: "We need to increase basic research now because it is through basic research as it is conducted in the universities that we educate the pro-

fessional scientists and engineers of the future; and the Nation, in the technological contest it faces, cannot afford any alternative."

Dr. C. Guy Suits, Vice President and Director of Research, General Electric Company, referred to basic research as necessary "learning work" that must precede "applied work." Along with other speakers, he particularly emphasized the high risk factor inherent in basic research, where the immediate result, knowledge, normally is years removed from profit. But, he said, "If you don't expect to be in business five years from now, there's no need for expenditures for scientific research, especially in the learning category." Experience has proven that a competently staffed, well-organized laboratory can obtain commercial success over the long run from its basic research expenditures.

Both Dr. Killian and Dr. Charles Hitch, the latter from RAND Corporation, expressed the view that universities continue to provide the best environment for basic research. Both also pointed out the need for innovation in institutional forms, including further development of industrywide cooperative research and the establishment of research institutes.

Distribution of resources within the research and development effort was also discussed. Dr. Martin R. Gainsbrugh of the National Industrial Conference Board contended that Federal allocations of resources for research are "primarily motivated by noneconomic considerations"—chiefly military.

Mr. Robert E. Johnson, Western Electric Company, discussed operations research, which he defined as "research into the nonphysical aspects of our economy." More and more operations research studies are being channeled into problems of research and development budget planning and decision making to maximize return from limited resources. Dr. Russell Ackoff, Case Institute of Technology, outlined three categories of decision-making in which tools of the social science disciplines—economics, psychology, and sociology—are all put to use along with mathematics:

(a) Determining the amount of company resources to be devoted to research and development.

(b) Dividing funds between basic and applied research.

(c) Selecting individual projects and determining when they should start and when they should end.

Mr. Ralph E. Burgess, American Cyanamid Company, touched on the same point: "It becomes clear that industry's participation in the nation's achieving its research needs is virtually contingent upon advances in knowledge about research as a science in itself."

Speakers stressed the need for effective use of human resources to avoid a research bottleneck resulting from shortages of scientific personnel. Dr. M. H. Trytten, National Academy of Sciences—National Research Council, noted that our historic concern with education as a whole had by "accident" produced enough technically trained people to meet past needs. However, the present rate of growth is too great to depend on chance. The temptation to draw the best brains away from teaching was noted by Dr. Bertrand Fox, Graduate School of Business Administration, Harvard University.

Dr. Suits defined the technical personnel problem as follows: "In our system we require an economic balance, and to use more technical people we have to learn how to employ them effectively. Although there is an economic limit to the *numbers* of technical people we can employ in industry, there is no limit to the *quality* of the required skills. * * * I think we should focus more attention on quality and less on quantity."

Dr. Killian noted that perhaps "more first-rate research is now done in the sciences in the United States than in any other country of the world. Our deficiency is at the very top, in the area over and above the first-rate, where the great intellectual breakthroughs occur, where great concepts and discoveries originate."

Foundation statistics released at the time of the conference demonstrated the bifurcation of industrial R&D support. The preliminary findings of a survey showed that in 1956 private industrial R&D totaled $6.5 billion; industry financing, $3.3 billion; and the Federal Government, $3.1 billion.

INTERNATIONAL GEOPHYSICAL YEAR

General

The International Geophysical Year (IGY) officially opened on July 1, 1957, with 66 nations and more than 10,000 scientists participating. This was the culmination of five years of international planning conducted by committees of scientists in many nations and the coordination of such planning by the Comité Spécial de l'Année Géophysique Internationale (CSAGI).

On this date, observations of geophysical measurements over the entire earth were begun at more than 2,500 stations. These observations will extend through December 31, 1958, and are being coordinated both in time and geographic coverage.

The countries participating in the International Geophysical Year are:

Argentina
Australia
Austria
Belgium
Bolivia
Brazil
Bulgaria
Burma
Canada
Ceylon
Chile
China, Republic of
Colombia
Cuba
Czechoslovakia
Denmark
Dominican Republic
East Africa
Ecuador
Egypt
Ethiopia
Finland
France
German Democratic Republic
German Federal Republic
Ghana
Greece
Guatemala
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Japan
Korea, Democratic Republic of
Malaya
Mexico
Mongolian Peoples Republic
Morocco

Netherlands
New Zealand
Norway
Pakistan
Panama
Peru
Philippines
Poland
Portugal
Rhodesia, Southern
Rumania
Spain
Sweden
Switzerland
Tunisia
Union of South Africa
Union of Soviet Socialist Republics
United Kingdom
United States of America
Uruguay
Venezuela
Vietnam Democratic Republic
Vietnam (Republic)
Yugoslavia

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 is conducting 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 being used because they are essential for extending the coverage of geophysical measurements to the outer limits of the high atmosphere.

World Data Centers

In readiness for the flow of data resulting from IGY observations, three World Data Centers have been established and are in operation under CSAGI agreements. These are World Data Center A, maintained by the United States; World Data Center B, established by the USSR; and World Data Center C, composed of eight nations of Western Europe (Sweden, Spain, France, Italy, Switzerland, United Kingdom, the German Federal Republic) and centers in Japan and Australia. The location and organization of these three centers will serve the geographical convenience of the scientists of all nations.

All original IGY data is sent to one or more of the three World Data Centers, where it is cataloged and stored. The receiving Center in turn immediately makes copies of the data for the other two Centers if these have not been supplied, and provides these copies free of charge. Thus three complete sets of IGY data are coming into existence. The

World Data Centers issue periodic catalog lists of the data in their archives at the end of each six months of the period of the IGY, and any institution or individual may obtain copies of the data from a Center at a nominal sum to cover reproduction costs.

The United States World Data Center is directed by the National Academy of Sciences' Coordination Office, Washington, D. C., and is organized into 11 subcenters, each responsible for the handling of data in a particular discipline or disciplines. The location of these subcenters are:

(1) Airglow and ionospheric physics—Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado.

(2) Aurora (instrumental observations)—Geophysical Institute, University of Alaska, College, Alaska.

(3) Aurora (visual observations)—Rockefeller Hall, Cornell University, Ithaca, New York.

(4) Cosmic rays—School of Physics, University of Minnesota, Minneapolis, Minnesota.

(5) Geomagnetism, gravity, and seismology—United States Coast and Geodetic Survey, Geophysics Division, Washington, D. C.

(6) Glaciology—American Geographical Society, Broadway at 156th Street, New York, New York.

(7) Longitude and latitude—United States Naval Observatory, Washington, D. C.

(8) Meteorology and nuclear radiation—National Weather Records Center, United States Weather Bureau, Asheville, North Carolina.

(9) Oceanography—Department of Oceanography and Meteorology, Agricultural and Mechanical College of Texas, College Station, Texas.

(10) Rockets and satellites—National Academy of Sciences-National Research Council, Washington, D. C.

(11) Solar activity—High Altitude Observatory, Boulder, Colorado.

Time schedules for submission of data to the World Data Centers arranged by CSAGI differ widely for the various disciplines, and therefore reports on the status of flow of data differ widely among the Centers. To date, World Data Center A reports the receipt of data from 56 of the 66 nations participating in the IGY.

Agreements for the interchange of data between the Centers are being met, as are those for the reproduction of copies of material to meet the demands of scientific bodies or investigators. World Data Center A has initiated several series of reports. One series for rockets and one for satellites will make available the results of rocket and satellite launchings

to interested scientists. Three issues of the satellite series have been published to date. Under an IGY General Report Series, World Data Center A has released one issue, a report of the Antarctic atmospheric circulation from observations made at the Antarctic Weather Central, Little America Station. Responsibilities for the interchange of data include the interim publication of data in some cases, and, as part of this latter function, Center A has already published solar data entitled "Reports of Surges and Active Prominence Regions" for the months of July, August, and September 1957. Other reports are in preparation for publication.

Antarctic Operations

In the fall of 1957, the Navy expedition DEEP FREEZE III, under the command of Rear Admiral George J. Dufek, USN, left the United States for the Antarctic, transporting the wintering-over team for the second year and the summer team for 1957–58, as well as materiel for the resupply of all stations. A second orientation program at Davisville, Rhode Island, was held for the second IGY scientific team. The scientific leaders named for the next 18-month period were:

Laurence Gould—Director of the U. S. IGY Antarctic Program.
Harry Wexler—Chief Scientist of the U. S. IGY Antarctic Program.
A. P. Crary—Deputy Chief Scientist and Scientific Leader at Little America Station.
Matthew Brennan—Scientific Leader at Ellsworth Station.
Stephen Barnes—Scientific Leader at Byrd Station.
Willis Tressler—Scientific Leader at Wilkes Station.
Palle Mogenson—Scientific Leader at Amundsen-Scott Pole Station.
Kenneth Salmon (New Zealand)—Scientific Leader at Hallett Station.

During the past year the planned program of observations at the six United States IGY stations has been under way. These observations included the fields of aurora and airglow, ionospheric physics, cosmic rays, geomagnetism, meteorology, seismology, and glaciology; and certain preliminary findings resulting from these observations are mentioned later in this section under the heading "Results of the First Twelve Months of Observations." In addition, during the 1957–58 summer season, 3 major traverses covering over 4,000 miles were undertaken from the Little America, Byrd, and Ellsworth Stations to study the

properties of the Antarctic icecap and other phenomena. Findings of these traverse parties supplement those resulting from observations at the 6 established stations and have added considerably to the knowledge of the Continent. The Ross Ice Shelf traverse party of 6 covered a distance of 1,440 miles in 113 days and studied principally properties of the Ross Ice Shelf. The Byrd traverse party covered 1,180 miles from November 19, 1957, to February 20, 1958. Its main purpose was to determine the general nature of the ice and protruding mountains in Marie Byrd Land and in the Ellsworth Highland east of the Byrd Station. The Ellsworth traverse investigated the Filchner Ice Shelf and the inland ice of Edith Ronne Land. This traverse left Ellsworth Station on October 28, 1957, and traveled 1,250 miles in 81 days. The traverse parties were supported by Naval air reconnaissance and resupply groups.

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 planning of the program's scientific aspects.

3. The Department of Defense, for provision of launching vehicles, for actual placing of the satellites into orbit, and for development of radio tracking and telemetering equipment.

The program is now based upon two launching vehicles, the Vanguard developed by the Navy, described in previous Annual Reports, and the Jupiter C contributed by the Army to the program.

During the past fiscal year, 6 successfully flown scientific earth satellites were launched as part of the IGY program, 3 by the Soviet Union and 3 by the United States. The following table gives information on the size, weight, and payload of the six satellites, as well as details of their launching vehicles. (See accompanying table.)

Eleven radio tracking stations have been established by the Naval Research Laboratory at the following locations:

Blossom Point, Maryland
Fort Stewart, Georgia
Havana, Cuba
Quito, Ecuador
Lima, Peru
Antofagasta, Chile
Santiago, Chile
Antigua, British West Indies
San Diego, California
Woomera, Australia
Esselen Park, Union of South Africa

IGY Satellite Table,[1] May 28, 1958

	1957 ALPHA (SPUTNIK I)	1957 BETA (SPUTNIK II)	1958 ALPHA (EXPLORER I)	1958 BETA (VANGUARD I)	1958 GAMMA (EXPLORER III)	1958 DELTA (SPUTNIK III)
Weight (lbs.)	184	1,120	30.8	3.25	31.0	2,925.
Shape	Sphere	Complex	Cylinder	Sphere	Cylinder	Conical.
Dimensions	22.8″		80″ long; 6″ in diameter.	6.4″ in diameter.	80″ long; 6″ in diameter.	11′ 9″ long; 5′ 8″ wide at base.
Experiments	Internal temperatures and pressures "and other data."	Cosmic rays; solar ultraviolet and X-radiation; test animal (dog); temperatures, pressures.	Cosmic rays; micrometeorite impact and erosion; temperatures.	Temperatures	Cosmic rays (with tape recorder); micro-meteorite impact and erosion; temperatures.	Atmospheric pressure and composition; satellite electrical and geomagnetic measurements; intensity of sun's corpuscular radiation; primary cosmic radiation; micro-meteorites; temperatures.
Power supply	Chemical batteries.	Chemical batteries.	Mercury batteries	a) Mercury batteries; b) solar batteries.	Mercury batteries	a) Chemical batteries; b) solar batteries.
Initial perigee (miles).	138	132	224	404	118	143.
Initial apogee (miles).	598	1,009	1,573	2,465	1,740	1,181.
Initial period (minutes).	96.25	103.3	114.8	134.29	115.9	106.
Inclination to Equator.	64.3°	65.4°	33.5°	34.25°	33.37°	65°.
Lifetime	October 4, 1957–January 4, 1958.	November 3, 1957–April 13, 1958.	January 31, 1958–(3 to 5 years).	March 17, 1958–(200 years).	March 26, 1958–.	May 15, 1958–.

[1] Shortened version of table prepared by U. S. National Committee for the IGY. Initial orbital elements from Naval Research Laboratory, based on latest refinements.

These stations were originally equipped to track the U. S. earth satellite at a frequency of 108 megacycles per second and to use the same frequency in the receipt of scientific information telemetered from the satellites. Because of the use of 20 and 40 megacycle-per-second transmitters by the USSR in their satellites, several of the "Minitrack" stations have been modified to receive the 40 megacycle-per-second frequency as well as the 108 megacycle-per-second frequency. Several additional tracking and telemetry stations using the electronic circuitry designated as "Microlock" have been established by various groups.

Twelve optical tracking stations have been established by the Smithsonian Institution and are in operation. These stations are located at the following sites:

White Sands, New Mexico	Cadiz, Spain
Florida, near Palm Beach	Shiraz, Iran
Curacao, Netherlands West Indies	Naima Tai, India
Arequipa, Peru	Woomera, Australia
Villa Dolores, Argentina	Mitaka, Japan
Olifantsfontein, South Africa	Haleakala, Maui, T. H.

The "Moonwatch" volunteer visual observing program being conducted by the Smithsonian Institution now numbers some 240 stations of which over 140 are in the United States and more than 100 in locations throughout the world other than in the United States or the USSR. Some 50–70 stations have been established within the USSR as part of the Russian equivalent of "Moonwatch."

In addition, a volunteer radio amateur satellite observation program called "Moonbeam" has been set up, as well as a program of amateur satellite photographic tracking under the auspices of the Society of Photographic Scientists and Engineers.

Some preliminary data resulting from the satellites launched so far have been exchanged, but it will take a number of months before complete interpretations of these data can be exchanged.

Results of First 12 Months of Observations

A report on the scientific results of the IGY must await careful, prolonged study and interpretation of the data. However, interesting findings during the first 12 months of observations in the various disciplines have been reported to date, some of which are influencing existing scientific theories and are indicative of the values to be derived from the program.

Solar Activity

For the first time in history, the sun has been kept under continuing observation by more than 100 stations. As a consequence of these observations, the World Warning Agency (AGIWARN) issued 25 alerts, and 11 Special World Intervals had been declared as of May 26, 1958. Significant events, such as geomagnetic, ionospheric, and/or cosmic ray disturbances took place during at least nine of these intervals. This patrol is also maintained for solar research purposes such as measuring the amount of energy released in solar flares by measuring the absolute change in transmission through the ionosphere at radio frequencies, measuring the brightness of light scattered by free electrons in the electron corona, and measuring magnetic fields at the sun's surface. Both optical and radio techniques are used.

Upper Atmosphere

In the upper atmosphere, an investigation in cosmic ray intensity has shown that the cosmic ray equator deviates systematically from the geomagnetic equator, suggesting that there may well be important magnetic fields, probably of extraterrestrial origin, which alter the trajectories of the incoming primary particles. Likewise, X-radiation not of cosmic origin has been found in the upper atmosphere, occurring at the same time that aurorae were observed overhead. Rocket penetrations of the ionosphere and aurorae have demonstrated the presence of an additional layer of ionization at a level some 12 miles below normal layers, apparently associated with solar X-ray emission associated in turn with the occurrence of solar flares. As of early 1958, the total cosmic ray intensity had decreased to about one-half the intensity present in 1954, varying inversely with the level of solar activity.

Observations indicate that aurorae occur simultaneously in the northern and southern hemispheres. Cosmic noise absorption data obtained by a joint auroral-ionospheric program show a generally progressive decrease in absorption at stations located at successively lower geomagnetic latitudes. The data begin to delineate an auroral absorption zone and confirm that nighttime absorption is definitely associated with visual auroral activity. X-radiation now appears to be associated with the occurrence of aurorae.

In the observations of whistlers (atmospheric electrical disturbances resulting in electromagnetic propagation in the audio frequency range, e. g., lightning), early experiments have demonstrated that the ion density and molecular concentration occurring at altitudes up to twice the earth's radius must be much greater than formerly anticipated. This

may confirm the theory that the earth's atmosphere extends far beyond the level where it had been previously thought to end and indicates that there may be a very tenuous atmosphere—possibly the sun's corona—filling all the space between the earth and the sun. A program of recording of subaudiofrequency geomagnetic fluctuations reveals that a number of the wave forms of these fluctuations, if increased in frequency, bear a high similarity to the wave forms of whistlers and other atmospheric radio phenomena. Because of current belief that some of the noise associated with whistlers is due to ionized gas entering the magnetic field of the earth, it is clear that these geomagnetic studies have a close connection to the studies of the transient conditions in the nearby interplanetary medium. Studies of magnetic effects in equatorial regions tentatively confirm the existence of the equatorial electroject, the equatorial electric current, possibly of several hundred thousand amperes, which is believed to encircle the earth high in the atmosphere and which plays a role in the magnetic effects observed on earth near the equator.

In the ionosphere, the vertical sounding program is giving new information about the several ionospheric layers. "True-height" determinations show that the F-layer undergoes a pronounced pinching, so that it changes from a very thick layer in the daytime to a very thin and high-density layer at night. Scatter measurements have led to the discovery of large-scale traveling disturbances in the F-region, which appear to be a kind of gigantic wave motion in the ionosphere. At times there also appear to be tilts in the F-layer that allow signal propagation over extremely long distances. The vertical sounding program in the Antarctic is aimed at determining whether the electronic clouds observed at the Pole Station during the polar night drift in from the region of the sunlit Antarctic Circle or whether a single cloud somehow persists throughout the winter. A diurnal variation is observed in the degree of ionization at the South Pole, and this variation may be related to the geomagnetic field behavior.

Meteorology and Oceanography

In the meteorology program, the concentration of carbon dioxide in the uncontaminated atmosphere appears to be remarkably constant over the world. As a consequence of the surface and high altitude observations now being collected from so many stations, weather forecasting is being improved. North American weather charts of useful accuracy can now be drawn up to 100,000 feet (10 millibars). The

high altitude observations along the 75th meridian have improved by 50 percent the forecasting in South America of winds aloft. Observations in the Antarctic for the first time reveal a significant warming trend of about five degrees Fahrenheit in annual mean temperature over a period of approximately 50 years, or less than one-half the warming trend in the Greenland Arctic. The Antarctic circulation for the first time is being plotted in considerable detail.

In oceanography, observations at the island stations confirm that there seems to be an exchange of water between the two hemispheres as the seasons change. The cruises and the deep current studies now being made, including the analysis of water samples, will yield valuable data on ages of water masses. The water samples also indicate that chlorophyll and productivity in the open sea may be two times as great as previously estimated. New deep currents and counter-currents are being charted. Cruise ships have run seismic profiles, taken bottom sediment samples, and made heat flow measurements. It was found that in regions of uplift the heat flow was larger than normal, while near severe downwarpings, the values were much less than expected. These findings lend support to the theory that there exist within the earth's mantle great convection currents that bring hot material up towards the bottom of the crust in regions of uplift and return this material, which has cooled in the meantime, back down toward the core of the earth in regions of downwarp. In fact, the convection currents themselves may be the cause of the uplifted and downwarped regions.

Seismology, Gravity Measurements, and Glaciology

In the seismology and gravity programs, detailed studies of the structures of the North American and South American continents indicate great nonuniformities and regional geographic differences in the mantle of the earth, as there are in the crustal rocks. In some regions mountains are held in isostatic balance by substructures of lighter crustal rocks extending downward into the heavier rock of the mantle. In other regions it now appears that another kind of structure may hold mountains up. A network of relatively narrow roots or veins of crustal rock may project into the mantle to depths as great as 200 kilometers. Long-period wave measurements will yield information on the variation of elastic properties in the earth's crust and mantle. Earth tides are being measured and sea surface gravity measurements are now extending the gravity network.

In the Antarctic, earthquakes are being measured from station seismographs. These will give much information about the structure of Antarctica itself and are also of other interest, since the majority of earthquakes occur in Pacific borders. Seismographic profiles obtained on the oversnow traverses lend additional information concerning Antarctic structure. Measurements of ice thickness indicate that the bottom of the ice sheet is far below sea level in various points. This may mean that the Antarctic is not a continent but may be composed of several land masses or may have frozen fjords or inland lakes. Glaciological and geological studies reveal that the Antarctic ice mantle is much thicker on the average than was previously assumed and that it was once about 1,000 feet thicker than it is now. It is not yet known whether the total ice mass is at present increasing or decreasing.

Rocketry

The rocketry program of the IGY has yielded much data concerning the chemical and ion composition of the Arctic atmosphere and ionosphere, and the diffusive separation of gases in the upper atmosphere. The distribution of temperature and pressure of the atmosphere at high northern latitudes has been partially measured. In the Antarctic, cosmic ray flights indicate that total intensity is within 5 percent of that in high northern latitudes.

Scientific Earth Satellites

In the U. S. satellites flown so far, skin and interior temperatures have been measured, and somewhat inconclusive data concerning a low incidence of micrometeorite impacts have been obtained. The chief finding to date is that of a tremendous intensity of cosmic radiation above approximately 600 miles, which overwhelmed the sensory device. It is hoped to adapt the sensory devices to measure this large intensity in future flights. Finally, observations of the orbits of the several satellites flown by the U. S. S. R. indicate that the density of the atmosphere at altitudes around 225 kilometers is higher than was previously supposed from theoretical considerations and calculations. Ionospheric measurements using radio signals from the U. S. S. R. satellites have yielded considerable data, among them an interesting but unexplained phenomenon—the discovery of radio signals coming apparently from a point antipodal to the actual satellite. Certain signals have been heard over remarkable ranges and wide angles, indicating the possibility of a channeling effect at certain altitudes in the ionosphere.

Conclusion

The IGY program has been gratifying to all concerned, not only in the elaborateness and completeness of the material preparations and the tremendous number of observing stations involved, but also in the enthusiasm with which all scientific groups and individual scientists are participating and the great evidence of the deepest international collaboration.

Appendices

APPENDIX A

National Science Board, Staff, Committees, and Advisory Panels

National Science Board

Terms expire May 10, 1960

Roger Adams, Research Professor, Department of Chemistry and Chemical Engineering, University of Illinois, Urbana, Ill.

Theodore M. Hesburgh, C. S. C., President, University of Notre Dame, Notre Dame, Ind.

William V. Houston, President, Rice Institute, Houston, Tex.

Donald H. McLaughlin, President, Homestake Mining Co., San Francisco, Calif.

Joseph C. Morris, Vice President, Tulane University of Louisiana, New Orleans, La.

Morrough P. O'Brien, Dean, College of Engineering, University of California, Berkeley, Calif.

Warren Weaver, Vice President for the Natural and Medical Sciences, The Rockefeller Foundation, New York, N. Y.

Douglas M. Whitaker, Vice President for Administration, The Rockefeller Institute, New York, N. Y.

Terms expire May 10, 1962

Laurence M. Gould, President, Carleton College, Northfield, Minn.

Paul M. Gross (Vice Chairman of the Board and Chairman of the Executive Committee), Vice President and Dean, Duke University, Durham, N. C.

George D. Humphrey, President, University of Wyoming, Laramie, Wyo.

Edward J. McShane, Professor of Mathematics, University of Virginia, Charlottesville, Va.

Frederick A. Middlebush, President Emeritus and Director of Development Fund, University of Missouri, Columbia, Mo.

Samuel M. Nabrit, President, Texas Southern University, Houston, Tex.

Julius A. Stratton, Acting President, Massachusetts Institute of Technology, Cambridge, Mass.

Edward L. Tatum, Member, The Rockefeller Institute, New York, N. Y.

Terms expire May 10, 1964

DETLEV W. BRONK (Chairman of the Board), President, National Academy of Sciences-National Research Council, Washington, D. C., and President, The Rockefeller Institute, New York, N. Y.

LEE A. DUBRIDGE, President, California Institute of Technology, Pasadena, Calif.

T. KEITH GLENNAN, President, Case Institute of Technology, Cleveland, Ohio.

ROBERT F. LOEB, Bard Professor of Medicine, College of Physicians and Surgeons, Columbia University, New York, N. Y.

KEVIN MCCANN, President, Defiance College, Defiance, Ohio.

JANE A. RUSSELL, Associate Professor of Biochemistry, Emory University, Atlanta, Ga.

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

ERNEST H. VOLWILER, Chairman of the Board, Abbott Laboratories, North Chicago, Ill.

* * * * * * *

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

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

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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*Served during part of fiscal year 1958.

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

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

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*Ralph W. Gerard, Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.

*Robert E. Hungate, Department of Bacteriology, University of California, Davis, Calif.

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*Served during part of fiscal year 1958.

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

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

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

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ERNEST NAGEL, Department of Philosophy, Columbia University, New York, N. Y.

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Paul J. Flory, Mellon Institute, 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.

APPENDIX B

Financial Report for Fiscal Year 1958

SALARIES AND EXPENSES APPROPRIATION

Receipts

Appropriation for fiscal year 1958	$49,750,000	
Unobligated balance from fiscal year 1957	1,552,533	
Appropriation reimbursements	83	
Total		$51,302,616

Obligations

Support of science:		
Basic research:		
Biological and medical sciences	$8,541,075	
Mathematical, physical, and engineering sciences	9,425,158	
Social sciences	553,750	
Antarctic research	922,800	
Subtotal	19,442,783	
Research facilities:		
Biological and medical sciences	987,050	
Mathematical, physical, and engineering sciences	5,039,001	
Subtotal	6,026,051	
Surveys and reports	192,000	
Dissemination of scientific information	1,796,099	
Attendance at international scientific meetings	119,900	
Subtotal, grants and contracts	27,576,833	
Program development, operation, and evaluation	1,125,829	
Total obligations—support of science		28,702,662
Support of scientific manpower:		
Graduate fellowships	$5,602,120	
Institutes program	12,212,030	
Special projects in science education	618,835	
Course content improvement program	835,372	
Clearinghouse for scientific manpower information	225,039	
President's Committee on Scientists and Engineers	135,283	
Subtotal, grants and contracts	19,628,679	
Program development, operation, and evaluation	819,400	
Total obligations—support of scientific manpower		20,448,079
Executive Direction and Management		822,730
Total obligations fiscal year 1958		49,973,471
Unobligated balance carried forward to fiscal year 1959		[1] 1,329,145
Total		51,302,616

[1] A substantial portion of the unobligated balance represents outstanding payments under grants and contracts with other Federal agencies.

INTERNATIONAL GEOPHYSICAL YEAR APPROPRIATIONS

Receipts

Appropriation for fiscal year 1958	$2,000,000	
Unobligated balance from fiscal year 1957	17,337,064	
Total		$19,337,064

Obligations

Technical programs	$13,845,965	
Administrative expenses, National Academy of Sciences—National Research Council	290,508	
Administrative expenses, National Science Foundation	60,998	
Total obligations, fiscal year 1958		14,197,471
Unobligated balance carried forward to fiscal year 1959		[1] 5,139,593
Total		19,337,064

[1] A substantial portion of the unobligated balance represents outstanding payments under grants and contracts with other Federal agencies.

TRUST FUND

Receipts

Unobligated balance from fiscal year 1957	$4,003	
Donations from private sources	3,281	
Total		$7,284

Obligations

Miscellaneous expenses	66
Unobligated balance carried forward to fiscal year 1959	7,218
	7,824

APPENDIX C

Grants for Basic Research

ANTHROPOLOGICAL SCIENCES

UNIVERSITY OF ARIZONA, Tucson, Ariz.

Emil W. Haury, Department of Anthropology; *Culture History of the Point of Pines Region;* 3 years; $19,700

Terah L. Smiley, Geochronology Laboratories; *Late Prehistory of Northern Arizona;* 2 years; $12,000

BRYN MAWR COLLEGE, Bryn Mawr, Pa.; Frederica de Laguna, Department of Anthropology; *Ethnological Research Among the Indians of Copper River;* 5 years; $13,800

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Joseph B. Birdsell, Department of Anthropology and Sociology, Los Angeles, Calif.; *Culture and Environmental Adaptation;* 1 year; $10,000

UNIVERSITY OF FLORIDA, Gainesville, Fla.; William H. Sears, Florida State Museum; *Prehistoric Processes on the Gulf Coastal Plain;* 3 years; $13,400

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; Demitri B. Shimkin, The Graduate Council; *Siberian Linguistic Analysis;* 1 year; $5,300

HARVARD UNIVERSITY, Cambridge, Mass.; Douglas L. Oliver, Department of Anthropology; *Anthropology Study of the Society Islands;* 3 years; $19,200

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.

Sol Saporta, Research Center in Anthropology, Folklore, and Linguistics, Indiana University; *Psycholinguistic Analysis of Consonant Clusters;* 2 years; $20,000.

Thomas A. Sebeok, Research Center in Anthropology, Folklore, and Linguistics, Indiana University; *Computer Research in Psycholinguistics;* 2 years; $20,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Richard K. Beardsley, Department of Anthropology; *Ethnographic Analysis of Farm Communities;* 2 years; $600

UNIVERSITY OF OREGON, Eugene, Oreg.; Luther C. Cressman, Department of Anthropology; *Oregon Coast Prehistory;* 1 year; $6,300

SACRAMENTO STATE COLLEGE, Sacramento, Calif.; Thomas Rhys Williams, Department of Anthropology; *Dusun Anthropology;* 1 year; $9,800

SCHOOL OF AMERICAN RESEARCH, Santa Fe, N. Mex.; Fred Wendorf, Associate Director for Research; *Monahans Ecology;* 1 year; $8,000

SMITHSONIAN INSTITUTION, Washington, D. C.

Clifford Evans and Betty J. Meggers, Division of Archaeology; *Reconstruction of Migration Routes;* 1 year; $2,100

Marshall T. Newman, U. S. National Museum; *Aboriginal History of the Peruvian Coast;* 1 year; $3,100

STANFORD UNIVERSITY, Stanford, Calif.; Alan R. Beals, Department of Anthropology; *Process in Community Differentiation;* 2 years; $11,000

TEMPLE UNIVERSITY, Philadelphia, Pa.; William B. Schwab, Department of Sociology and Anthropology; *Gwelo Urban Study;* 2 years; $5,000

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; E. Wyllys Andrews, Middle American Research Institute; *Development of Pre-Columbian Culture;* 2 years; $25,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.; James B. Watson, Department of Anthropology; *New Guinea Studies;* 1 year; $4,100

UNIVERSITY OF WISCONSIN, Madison, Wis.; David A. Baerreis, Department of Sociology; *Interrelations of Biological and Cultural Change;* 1 year; $15,500

ASTRONOMY

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; D. H. McNamara, Department of Mathematics; *A Spectrographic Study of Eclipsing Binaries and of Beta Canis Majoris Variables;* 2 years; $10,400.

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Jesse L. Greenstein, Chairman, Department of Astrophysics; *The Identification of Radio Sources;* 6 months; $3,200

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Otto Struve and C. R. Lynds, Department of Astronomy; *A Search for Variable Stars in Galactic Clusters;* 2 years; $4,800

CARNEGIE INSTITUTION OF WASHINGTON, Washington, D. C.; M. A. Tuve, Chairman, Department of Terrestrial Magnetism; *Investigation and Construction of Photoelectric Image Tubes For Research in Astronomy;* 15 months; $255,000

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; J. J. Nassau, Head, Department of Astronomy; *Distribution of A-Type Stars in Selected Galactic Regions;* 1 year; $5,900

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

UNIVERSITY OF FLORIDA, Gainesville, Fla.; A. G. Smith, Department of Physics; *Planetary Emissions at Radio Frequencies;* 2 years; $20,000

FORDHAM UNIVERSITY, New York, N. Y.; Walter J. Miller, Fordham University Astronomical Laboratory; *Faint Variable Stars in the Cygnus Cloud of the Milky Way;* 2 years; $5,900

GEORGETOWN UNIVERSITY, Washington, D. C.

Heinrich K. Eichhorn, Department of Astronomy; *Determination of the Inner Systematic Errors of the Northern Hyderabad Zones of the Astrographic Catalogue and Redetermination of Its Plate Constants;* 2 years; $12,500

Carl C. Kiess, Georgetown College Obervatory; *A Search for Faint Lines in the Spectrum of the Sun and the Measurement of the Laboratory Spectrum of Titanium;* 1 year; $24,000

HARVARD UNIVERSITY, Cambridge, Mass.

David Layzer, Harvard College Observatory; *Theoretical Energy Levels and Transition Probabilities;* 2 years; $9,900

T. K. Menon and H. I. Ewen, Harvard College Observatory; *Radio Astronomy in the Microwave Region;* 1 year; $34,300

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Ivan R. King, Department of Astronomy; *The Dynamical Evolution of Star Clusters;* 2 years; $4,200

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; John D. Strong, Laboratory of Astrophysics and Physical Meteorology; *High Altitude Astronomy;* 1 year; $40,000

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Kenneth M. Yoss, Department of Physics and Astronomy; *Relative Frequencies of G and K Giants With Weak and Strong Absorption;* 2 years; $9,300

LOWELL OBSERVATORY, Flagstaff, Ariz.; H. L. Giclas, Astronomer; *Proper Motion Survey of the Northern Hemisphere;* 3 years; $29,400

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; John S. Mathis, Department of Physics and Astronomy; *The Kinematics of the Interior Regions of Globular Clusters;* 1 year; $2,900

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS, State College, N. M.; Clyde W. Tombaugh, Physical Sciences Laboratory; *An Observational Patrol and Geophysical Research of the Moon and the Planets;* 1 year; $25,000

OHIO STATE UNIVERSITY, Columbus, Ohio.

John D. Kraus, Department of Electrical Engineering; *A Fixed Paraboloid and Tiltable-Flat Reflector for Radio Astronomy Research;* 1 year; $58,650

A. Slettebak, Department of Physics and Astronomy; *A Spectrographic Study of A-Type Stars Near the North Galactic Pole;* 1 year; $3,500

UNIVERSITY OF OREGON, Eugene, Oreg.; E. G. Ebbighausen, Department of Physics; *An Investigation of Spectroscopic Binaries With Particular Attention to the Detection of Changes in the Orbital Elements;* 1 year; $8,000

PRINCETON UNIVERSITY, Princeton, N. J.; Martin Schwarzschild, Department of Astronomy; *High Altitude Astronomy;* 3 years; $285,000

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; J. Mayo Greenberg, Department of Physics; *The Scattering of Light by Small Particles;* 2 years; $19,400

SWARTHMORE COLLEGE, Swarthmore, Pa.; Peter van de Kamp, Director, Sproul Observatory; *Astrometric Study of Nearby Stars;* 2 years; $27,000

VANDERBILT UNIVERSITY, Nashville, Tenn.; Carl K. Seyfert, Director, Arthur J. Dyer Observatory; *An Investigation of the Structure of the Galaxy Through the Study of the Nearer Associations of OB Stars;* 2 years; $14,000

WAYNE STATE UNIVERSITY, Detroit, Mich.; Bertram Donn, Department of Physics; *Astrochemical Research;* 2 years; $13,500

UNIVERSITY OF WISCONSIN, Madison, Wis.

Arthur D. Code, Director, Washburn Observatory; *Absolute Calibration of the Energy Distribution of Astronomical Radiation Sources;* 2 years; $16,700

J. E. Mack, Department of Physics; *Interferometric Study of Coronal Emission;* 1 year; $10,700

YALE UNIVERSITY, New Haven, Conn.

Dirk Brouwer, Director, Yale University Observatory; *Relocation of the Yale Observatory;* 1 year; $22,000

Harlan J. Smith, Department of Astronomy; *Investigation of Planetary Nonthermal Radio Emission;* 2 years; $21,000

Rupert Wildt, Yale University Observatory; *Constitution of the Late-Type Stellar Atmospheres and Interiors;* 2 years; $7,500

CHEMISTRY

UNIVERSITY OF ARIZONA, Tucson, Ariz.

James W. Berry, Department of Chemistry: *Heterocyclic Tropolones and Tropones;* 2 years; $4,100

Leslie Forster, Department of Chemistry; *Singlet-Triplet Transitions in Fluid Systems;* 2 years; $11,200

ARIZONA STATE COLLEGE, Tempe, Ariz.; Roland K. Robins, Department of Chemistry; *Physical and Chemical Properties and Structure of Certain Purines and Purine Antagonists;* 2 years; $14,400

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.

Richard W. Fink, Department of Chemistry; *Radiochemical Studies of Decay Properties of Radioactive Nuclei;* 2 years; $30,200

Thomas C. Hoering, Department of Chemistry; *Kinetics of Exchange of Isotopic Oxygen Between Oxy-Anions and Water;* 2 years; $14,300

Samuel Siegel, Department of Chemistry; *Stereochemistry of Catalytic Hydrogenation of Aromatic and Hydroaromatic Compounds;* 2 years; $15,000

K. H. Stern, Department of Chemistry; *Thermodynamics of Ion Pair Formation;* 2 years; $13,800

AUBURN RESEARCH FOUNDATION, INC., Auburn, Ala.; G. M. Kosolapoff, Department of Chemistry; *Physical Constants of Organophosphorus Compounds;* 3 years; $18,500

BRANDEIS UNIVERSITY, Waltham, Mass.

Saul G. Cohen, Department of Chemistry; *Chemistry of Free Radicals in Solution;* 3 years; $25,400

Harold Conroy, Department of Chemistry; *Structure and Theoretical Biogenesis of Alkaloids;* 3 years; $34,800

BRIGHAM YOUNG UNIVERSITY, Provo, Utah.

Eliot A. Butler and Keith Anderson, Department of Chemistry; *Detection of Molecu-*

lar Species in Ionic Equilibria; 3 years; $26,400

K. Leroi Nelson, Department of Chemistry; *Low Temperature Kinetics in Aprotic Solvents;* 2 years; $20,400

BROWN UNIVERSITY, Providence, R. I.

Robert H. Cole, Department of Chemistry; *Dielectric Properties of Imperfect Gases;* 2 years; $15,700

John Ross, Department of Chemistry; *Viscosity of Gases;* 3 years; $14,000

BRYN MAWR COLLEGE, Bryn Mawr, Pa.; Ernest Berliner, Department of Chemistry; *Relative Reactivities of Polynuclear Aromatic Systems;* 3 years; $11,100

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; Howard Tieckelmann, Department of Chemistry; *Synthesis of Compounds Related to the Vitamin B_1 Pyrimidine;* 3 months; $4,500

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.

John H. Richards, Department of Chemistry; *Sandwich Compounds of Ruthenium;* 1 year; $2,200

John D. Roberts, Department of Chemistry; *Chemistry of Small Ring Compounds;* 3 years; $21,200

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Thomas L. Allen, Department of Chemistry; Davis, Calif.; *Thermodynamic Properties of Metallic Halides;* 3 years; $9,200

Robert K. Brinton, Department of Chemistry, Davis, Calif.; *Elementary Gas Phase Radical Reactions;* 3 years; $11,000

Joel H. Hildebrand, Department of Chemistry; *Properties and Solubility Relations of Nonelectrolytes;* 2 years; $16,900

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert B. Carlin, Department of Chemistry; *Fischer Indole Synthesis;* 2 years; $14,100

CENTRAL STATE COLLEGE, Wilberforce, Ohio; E. Oscar Woolfolk, Department of Chemistry; *Identification and Chromatographic Separation of Colorless Organic Compounds;* 2 years; $6,300

UNIVERSITY OF CHICAGO, Chicago, Ill.

Robert A. Clement, Department of Chemistry; *Bronsted Rate Law Applied to Organic Reactions;* 2 years; $13,000

R. S. Mulliken, Department of Physics, and W. G. Brown, Department of Chemistry; *Structure, Spectra and Reactions of Molecular Complexes;* 3 years; $58,000

Stuart A. Rice, Department of Chemistry; *Configurational and Thermodynamic Properties of Polyelectrolytes and Polar Polymers;* 3 years; $31,700

Henry Taube, Department of Chemistry; *Chemistry of Oxygen and Oxy-Compounds;* 3 years; $44,200

CLEMSON AGRICULTURAL COLLEGE, Clemson, S. C.; F. I. Brownley, Jr., Department of Chemistry and Geology; *Determination of Fluoride;* 2 years; $4,400

COE COLLEGE, Cedar Rapids, Iowa; Frank C. Pennington, Department of Chemistry; *New Method of Synthesizing Indoles;* 2 years; $6,600

UNIVERSITY OF COLORADO, Boulder, Colo.

Stanley J. Cristol, Department of Chemistry; *Mechanisms of Addition and Elimination Reactions;* 3 years; $36,400

John S. Meek, Department of Chemistry; *Bridgehead Compounds;* 3 years; $16,200

CORNELL COLLEGE, Mount Vernon, Iowa

James B. Culbertson, Department of Chemistry; *Steric Effects With Substituted Cyclohexane Compounds;* 3 months; $1,600

James B. Culbertson, Department of Chemistry; *Steric Effects With Substituted Cyclohexanes;* 3 years; $8,500

William A. Deskin, Department of Chemistry; *Spectrophotometric Studies of Metals;* 3 months; $1,400

William A. Deskin, Department of Chemistry; *Complexes of the Transition Metals;* 3 years; $10,500

CORNELL UNIVERSITY, Ithaca, N. Y.

Equipment Grants for High Polymer Research

UNIVERSITY OF DENVER, Denver, Colo.; Earl A. Engle and G. Howard McCormick, Department of Chemistry; *Determination of Zirconium, Iron Chelate Compounds;* 3 months; $3,500

DEPAUL UNIVERSITY, Chicago, Ill.; Eugene Lieber, Department of Chemistry; *Reaction of Hydrazoic Acid With Ammono-Carbonic Acids;* 2 years; $5,500

DUKE UNIVERSITY, Durham, N. C.; C. R. Hauser, Department of Chemistry; *Rearrangements, Eliminations, Displacements and Condensations;* 3 years; $19,500

EMORY UNIVERSITY, Emory University, Ga.; R. A. Day, Jr., Department of Chemistry; *Anion Exchange Studies of Metal Complexes;* 2 years; $12,000

FISK UNIVERSITY, Nashville, Tenn.; S. P. Massie, Department of Chemistry; *1,2-Dianilinoethane and 1,3-Dianilinopropane Derivatives;* 18 months; $3,500

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; John E. Leffler, Department of Chemistry; *Iodine as a Substituent;* 3 years; $21,700

UNIVERSITY OF FLORIDA, Gainesville, Fla.; E. E. Muschlitz, W. H. Cramer and T. L. Bailey, Department of Chemistry; *Negative Ion Studies by Mass Spectrometry;* 2 years; $20,000

GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; Jack Hine, Department of Chemistry; *Relative Acidity of Hydrocarbons and Other Weak Acids;* 2 years; $6,700

GRINNELL COLLEGE, Grinnell, Iowa; William A. Nevill, Department of Chemistry; *Halogenated Cyclobutane Acids;* 3 years; $9,500

HARVARD UNIVERSITY, Cambridge, Mass.

George B. Kistiakowsky, Department of Chemistry; *Unstable Intermediates in Gas Reactions;* 2 years; $15,000

Francis G. Stone, Department of Chemistry; *Chemistry of Boron;* 3 years; $24,100

Robert B. Woodward, Department of Chemistry; *Structure and Synthesis of Natural Products;* 3 years; $62,100

HUNTER COLLEGE, New York, N. Y.; Horst W. Hoyer, Department of Chemistry; *Electrophoretic Mobility of Micelles;* 2 years; $12,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Equipment Grant for High Polymer Research

David Y. Curtin, Department of Chemistry; *Steric Control of Organic Reactions;* 3 years; $20,900

H. S. Gutowsky, Department of Chemistry; *Nuclear and Quadrupole Relaxation;* 2 years; $24,200

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.

V. J. Shiner, Jr., Department of Chemistry, Indiana University; *Effect of Deuterium Substitution on Rates of Organic Reactions;* 3 years; $20,300

Harrison Shull, Department of Chemistry, Indiana University; *Theoretical Studies of Atomic and Molecular Structure;* 30 months; $43,700

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa.

Lawrence S. Bartell, Department of Chemistry; *High Precision Molecular Structures by Electron Diffraction;* 3 years; $23,700

George S. Hammond, Department of Chemistry; *Diffusion Kinetics in Thermal Decompositions;* 2 years; $19,200

KALAMAZOO COLLEGE, Kalamazoo, Mich.; Kurt D. Kaufman, Department of Chemistry; *Furocoumarins;* 3 years; $12,000

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE, Manhattan, Kans.; Jack L. Lambert, Department of Chemistry; *Metal Complexes and Chelates of Aromatic Acids;* 3 years; $14,400

LEHIGH UNIVERSITY, Bethlehem, Pa.; David M. Hercules, Department of Chemistry; *Luminescence of Orthohydroxy Aromatic Acids;* 3 years; $21,000

LONG BEACH STATE COLLEGE, Long Beach, Calif.; Robert B. Henderson, Department of Chemistry; *Summer Research for High School and College Chemistry Teachers;* 3 months; $5,200

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; J. P. Phillips, Department of Chemistry; *Analytical Reagents Related to 8-Quinolinol;* 3 years; $11,000

LOYOLA UNIVERSITY, Chicago, Ill.; John L. Huston, Department of Chemistry; *Exchange Reactions in Nonaqueous Ionizing Solvents;* 2 years; $13,300

LUTHER COLLEGE, Decorah, Iowa; Adrian Docken, Department of Chemistry; *Condensed, Five-Membered Carbocyclic Systems;* 1 year; $2,000

UNIVERSITY OF MAINE, Orono, Maine; Robert Dunlap, Department of Chemistry; *Thermodynamic Properties of Fluorocarbon Solutions;* 3 years; $18,300

UNIVERSITY OF MARYLAND, College Park, Md.

William J. Bailey, Department of Chemistry; *Pyrolysis of Esters;* 3 years; $43,800

Ernest F. Pratt, Department of Chemistry; *Selective Reaction of Organic Compounds Adsorbed on Solids;* 1 year; $11,400

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.

Klaus Biemann, Department of Chemistry; *Boron Trifluoride as a Titrant in Organic Analysis;* 3 years; $16,600

Arthur C. Cope, Department of Chemistry; *Stereochemistry of the Reactants Upon Ionic and Radical Reactions;* 5 years; $98,200

Herbert O. House, Department of Chemistry; *Stereochemistry of Elimination Reactions Occurring on Metal Surfaces;* 3 years; $16,200

C. Gardner Swain, Department of Chemistry; *Polar Displacement Reactions;* 3 years; $21,500

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; Richard S. Stein, Department of Chemistry; *Relationship Between Crystal Morphology and Mechanical Properties of Crystalline High Polymers;* 2 years; $12,100

MELLON INSTITUTE OF INDUSTRIAL RESEARCH, Pittsburgh, Pa.; P. J. Flory, Executive Director of Research; *Properties of Polymers and Their Solutions;* 1 year; $16,200

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Maurice M. Kreevoy, Department of Chemistry; *Acid Clevage of Organomercurials;* 2 years; $5,400

MISSISSIPPI STATE COLLEGE, State College, Miss.; Lyell C. Behr, Department of Chemistry; *Reactivity of Oxadiazoles in Substitution;* 3 years; $6,400

MONMOUTH COLLEGE, Monmouth, Ill.; G. W. Thiessen, Department of Chemistry; *The Kolbe Electrolysis;* 2 years; $12,200

NEWARK COLLEGE OF ENGINEERING, Newark, N. J.; James A. Bradley, Department of Chemistry; *Sulfonation of Aromatic Compounds;* 3 months; $2,100

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; Alexander R. Amell, Department of Chemistry; *Kinetics of the Gas Phase Reaction Between Nitrogen Pentoxide and Some Reducing Agents;* 2 years; $10,000

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; E. Gerald Meyer, Department of Chemistry; *Summer Research for High School Chemistry Teachers;* 3 months; $4,300

NEW YORK UNIVERSITY, New York, N. Y.; Benson R. Sundheim, Department of Chemistry; *Dissociation Constants of Excited Molecules;* 3 years; $10,100

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.

J. C. Morrow, Department of Chemistry; *Magnetochemical and Crystallographic Studies of Transition Metal Compounds;* 3 years; $17,200

Oscar K. Rice, Department of Chemistry; *Decomposition of Azomethane;* 2 years; $15,900

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Edward J. O'Reilly, Jr., Department of Chemistry; *Vibrational Assignment of Symmetrically Substituted Naphthalene-D-4;* 2 years; $10,900

NORTHWESTERN UNIVERSITY, Evanston, Ill., Fred Basolo, Department of Chemistry, *Nuclear Magnetic Resonance Studies of Metal Complexes;* 2 years; $17,100

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Louis Pierce, Department of Chemistry; *Molecular Microwave Spectroscopy;* 2 years; $18,300

OHIO STATE UNIVERSITY, Columbus, Ohio.

Michael P. Cava, Department of Chemistry; *The Benzocyclobutene Series;* 3 years; $39,800

Melvin S. Newman, Department of Chemistry; *Differentiation and Isolation of Rotamers;* 1 year; $8,200

Melville L. Wolfrom, Department of Chemistry; *Structural Investigation of Polysaccharides;* 3 years; $25,000

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; Norman Fogel, Department of Chemistry, University of Oklahoma; *Effects of Ionic Strength on the Distribution of Species of Complex Ions;* 2 years; $10,400

OREGON STATE COLLEGE, Corvallis, Oreg.

Ervin F. Kurth, Department of Chemistry; *Conifer Bark Lignin Components;* 3 years; $17,700

W. H. Slabaugh, Department of Chemistry; *Ion Exchange of Graphite Oxide;* 2 years; $8,500

UNIVERSITY OF OREGON, Eugene, Oreg.; Terrell L. Hill, Department of Chemistry; *Theoretical Studies in Statistical Chemical Thermodynamics;* 3 years; $32,600

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.

Norman C. Deno, Department of Chemistry; *Quantitative Theory Relating Acid-Catalyzed Reaction Ranges to Acid Concentrations and Other Media Changes;* 3 years; $17,200

Maurice Shamma, Department of Chemistry; *Synthesis and Chemistry of Tetrahydropyridines;* 2 years; $8,000

Harry D. Zook, Department of Chemistry; *Nature and Reactivity of Enolates;* 3 years; $19,100

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; John G. Miller, Department of Chemistry; *Compressibility Factor Measurements of Thermodynamic and Molecular Properties of Gaseous Mixtures;* 1 year; $11,000

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; C. G. Overberger, Department of Chemistry; *Chemistry of 1,1- and 1,2-Substituted Hydrazines and Cyclic Azo Compounds;* 3 years; $26,200

POMONA COLLEGE, Claremont, Calif.; Corwin Hansch, Department of Chemistry; *Summer Research for College Chemistry Teachers;* 3 months; $5,300

PRINCETON UNIVERSITY, Princeton, N. J.

James R. Arnold, Department of Chemistry; *Natural and Induced Radioactivities;* 1 year; $11,800

Charles P. Smyth, Chemistry Department; *Rotational Isomerism and Intramolecular Motion;* 2 years; $17,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

Robert A. Benkeser, Department of Chemistry, Purdue University; *Organic Chemistry of Silicon, Germanium and Tin Compounds;* 2 years; $15,400

Robert A. Benkeser, Department of Chemistry, Purdue University; *Reductions by Lithium in Amine Solvents;* 2 years; $10,600

Norbert Muller, Department of Chemistry, Purdue University; *High Resolution Nuclear Magnetic Resonance Spectrometry;* 3 years; $34,000

J. M. Honig, Department of Chemistry, Purdue University; *Interaction Between Metal Oxides and Nitrogen Dioxide;* 2 years; $17,500

R. L. Livingston, Department of Chemistry, Purdue University; *Molecular Structure of Certain Organic Compounds by Electron Diffraction;* 2 years; $12,800

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.

George J. Janz, Department of Chemistry; *Raman Spectra of Molten Salts;* 2 years; $28,000

Robert L. Strong, Department of Chemistry; *Primary Photochemical Act in Solution Reactions;* 2 years; $11,000

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; Michael Szwarc, Department of Chemistry, College of Forestry, Syracuse, N. Y.; *Chemistry of Free Radicals;* 3 years; $80,200

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; A. B. F. Duncan, Department of Chemistry; *Electronic Structure of Polyatomic Molecules;* 2 years; $12,000

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, New York, N. Y.; D. A. MacInnes, Department of Chemistry; *Redetermination of the Value of the Faraday;* 1 year; $15,300

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Donald B. Denney, Department of Chemistry; *Organic Tri- and Pentavalent Phosphorus Compounds;* 2 years; $12,000

ST. LOUIS UNIVERSITY, St. Louis, Mo.; George W. Schaeffer, Department of Chemistry; *Reduction of Inorganic Substances With Aqueous Sodium Borohydride;* 3 years; $10,500

SMITH COLLEGE, Northampton, Mass.; Milton D. Soffer, Department of Chemistry; *Synthesis and Structure of Sesquiterpenes;* 2 years; $15,500

UNIVERSITY OF SOUTH CAROLINA, Columbia, S. C.

H. W. Davis, Department of Chemistry; *Summer Research for High School and College Chemistry Teachers;* 3 months; $3,000

DeLos F. DeTar, Department of Chemistry; *Organic Reaction Mechanisms;* 3 years; $20,500

John L. Kice, Department of Chemistry; *Reactivity Toward Free Radicals of Non-Benzenoid Aromatic Hydrocarbons;* 2 years; $15,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.

Jerome A. Berson, Department of Chemistry; *Stereochemistry of Biphenyl Systems;* 2 years; $16,800

Norman Kharasch, Department of Chemistry; *Reaction of 2,4-Dinitrobenzenesulfenyl Chloride With Phenylacetylene and P-Substituted Phenylacetylenes;* 3 years; $10,300

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; John J. Banewicz, Department of Chemistry; *Magnetic And Electrical Properties of Antiferromagnetic Semiconductors;* 2 years; $9,600

STANFORD UNIVERSITY, Stanford Calif.; George S. Parks, Department of Chemistry and Chemical Engineering; *Heats of Combustion of Typical Oxygen Containing Organic Compounds;* 3 years; $25,600

THIEL COLLEGE, Greenville, Pa.; Walter H. Puterbaugh, Department of Chemistry; *Mechanism and Influence of Metallic Cation in Organo-Metallic Reactions;* 2 years; $5,000

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; Joseph H. Boyer, Department of Chemistry; *Reaction of C-Nitroso Compounds With Unsaturated Groups;* 2 years; $13,100

UNIVERSITY OF UTAH, Salt Lake City, Utah; Henry Eyring, Department of Chemistry; *Theoretical and Experimental Study of Rate Processes;* 2 years; $45,000

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Thomas I. Crowell, Department of Chemistry; *Kinetic Studies of Amines;* 3 years; $14,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.

B. S. Rabinovitch, Department of Chemistry; *Homogeneous Isomerization Reactions;* 3 years; $15,500

Kenneth B. Wiberg, Department of Chemistry; *Mechanisms of Oxidation Reactions;* 5 years; $68,200

WAYNE STATE UNIVERSITY, Detroit, Mich.

Norman L. Allinger, Department of Chemistry; *Conformational Effects In Medium Rings;* 3 years; $15,300

Stanley Kirschner, Department of Chemistry; *Summer Research For High School and College Chemistry Teachers;* 3 months; $8,300

C. L. Stevens, Department of Chemistry; *Gem–Dihalides From the Hofmann Degradation Reaction;* 2 years; $15,400

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; Chester W. Muth, Department of Chemistry; *Intramolecular Cyclization Involving a Nitro Group;* 2 years; $9,600

WESTERN KENTUCKY STATE COLLEGE, Bowling Green, Ky.; Ward C. Sumpter, Department of Chemistry; *Identification and Characterization of Indole Derivatives by Fusion Methods;* 2 years; $6,000

WESTERN MICHIGAN UNIVERSITY, Kalamazoo, Mich., Don C. Iffland, Department of Chemistry; *Chemistry of Azoacetates; A New Class of Compounds;* 3 years; $15,200

WHITWORTH COLLEGE, Spokane, Wash.; James R. Brathovde, Department of Chemistry; *X-Ray Phase and Structure Studies of N-Aliphatic Amides;* 3 years; $6,900

COLLEGE OF WOOSTER, Wooster, Ohio; Thomas E. Ferington, Department of Chemistry; *Kinetics of Vinyl Polymerization;* 2 years; $5,200

DEVELOPMENTAL BIOLOGY

UNIVERSITY OF ARIZONA, Tucson, Ariz.; John V. Slater, Department of Zoology; *Nucleo-Cytoplasmic Interactions During Intracellular Differentiation;* 2 years; $8,000

BOSTON DISPENSARY, Boston, Mass.; Gerhard Schmidt; *Embryochemical Studies on Lipides, Proteins, and Nucleic Acids;* 2 years; $15,500

BRANDEIS UNIVERSITY, Waltham, Mass.; Maurice Sussman, Department of Biology; *Morphogenesis in the Cellular Slime Molds;* 2 years; $11,500

BROWN UNIVERSITY, Providence, R. I.; William Montagna, Department of Biology; *Comparative Histology and Histochemistry of the Skin of Primates;* 2 years; $10,000

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

William A. Jensen, Department of Biology; *Early Cell Wall Formation in the Root Tip;* 2 years; $12,100

Julian L. Kavanau, Department of Zoology, Los Angeles, Calif.; *Chemical Background of Cell Division;* 2 years; $13,500

CANISIUS COLLEGE, Buffalo, N. Y.; John L. Blum, Department of Biology; *Sexuality in Botrydium and Protosiphon;* 2 years; $10,300

CARLETON COLLEGE, Northfield, Minn.; William H. Muir, Department of Biology; *Differentiation in Plant Tissue Cultures of Single Cell Origin;* 2 years; $6,900

CENTRAL WASHINGTON COLLEGE OF EDUCATION, Ellensburg, Wash.; Janet M. Lowe, Department of Zoology; *Early Chick Embryo Differentiation and Development;* 2 years; $5,000

CORNELL UNIVERSITY, Ithaca, N. Y.; Perry W. Gilbert, Department of Zoology; *Structural and Functional Relationship of Developing Young to Mother;* 1 year; $3,000

CREIGHTON UNIVERSITY, Omaha, Nebr.; Allen B. Schlesinger, Department of Biology; *Effect of Spatially Distributed Yolk Components Upon Embryonic Development;* 2 years; $6,600

UNIVERSITY OF DELAWARE, Newark, Del.; Franklin C. Daiber, Department of Biological Sciences; *Reproductive Functions in Elasmobranch Fishes;* 2 years; $10,000

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; James R. Fisher, Department of Chemistry; *Cell Particulates in Sea Urchin Eggs;* 1 year; $3,000

GRINNELL COLLEGE, Grinnell, Iowa; Guillermo Mendoza, Department of Biology; *Reproduction in hte Goodeidae;* 3 years; $13,300

UNIVERSITY OF IDAHO, Moscow, Idaho; Lorin W. Roberts, Department of Botany; *A Histochemical Study of Protein-Bound Sulfhydryl Groups in Wound Meristems;* 2 years; $5,300

UNIVERSITY OF ILLINOIS, Urbana, Ill.; S. Meryl Rose, Department of Zoology; *Specific Inhibition During Differentiation in Tubularia;* 1 year; $15,000

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Robert Briggs, Department of Zoology, Indiana University; *Nuclear Differentiation in Embryonic Cells;* 3 years; $26,000

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.

Andre T. Jagendorf, Department of Biology; *Chloroplast Growth Processes;* 3 years; $23,000

Clement L. Markert, Department of Biology; *Biochemical Basis of Cell Differentiation;* 3 years; $35,000

Malcolm S. Steinberg, Department of Biology; *Chemical Bonds Between Vertebrate Embryonic Cells;* 2 years; $12,000

LOYOLA UNIVERSITY, Chicago, Ill.; Boris E. N. Spiroff, Department of Biological Sciences; *Functions of the Pineal Body;* 1 year; $4,000

MARQUETTE UNIVERSITY, Milwaukee, Wis.

Walter G. Rosen, Department of Biology; *Chemotropism of Pollen Tubes;* 2 years; $12,000

John W. Saunders, Jr., Department of Biology; *Tissue Interactions During Organogenesis;* 3 years; $27,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Robert J. Hansen, Department of Civil Engineering; *The Form and Function of the Foot;* 2 years; $16,000

MIAMI UNIVERSITY, Oxford, Ohio; John R. Harrison, Department of Zoology; *Growth and Differentiation of Embryonic Chick Tissues in Vitro;* 2 years; $10,300

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Charlotte J. Avers, Department of Botany; *Histochemical Studies of the Differentiating Root Epidermis;* 2 years; $13,800

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; Charlotte G. Nast, Department of Botany; *Fertilization Studies of Angiosperms;* 1 year; $7,400

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; Ernest Ball, Division of Biological Sciences; *Growth in Vitro of the Shoot Apex of Certain Seed Plants;* 3 years; $23,000

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Robert C. King, Cresap Laboratory of Biology; *Radiation-Induced Ovarian Tumors in Drosophila;* 2 years; $18,000

OGLETHORPE UNIVERSITY, Oglethorpe University, Ga.; Arthur L. Cohen, Department of Biology; *Morphogenesis in the True Myxomycetes;* 1 year; $1,700

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.

Casimer T. Grabowski, Department of Anatomy; *Organization and Cellular Differentiation in Embryos;* 2 years; $12,000

Ian M. Sussex, Department of Biological Sciences; *Morphogenesis in the Shoot of Vascular Plants;* 2 years; $17,300

PRINCETON UNIVERSITY, Princeton, N. J.; Lionel I. Rebhun, Department of Biology; *Fertilization and Cleavage in Marine Invertebrate Eggs;* 2 years; $8,900

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; William B. Muchmore, Department of Biology; *Immunochemical Studies of Muscle Development;* 3 years; $24,000

SOUTHERN ILLINOIS UNIVERSITY, Carbondale, Ill.; Frank J. Finamore, Department of Physiology; *Nucleic Acid Metabolism During Early Developmental Stages;* 3 years; $15,000

STANFORD UNIVERSITY, Stanford, Calif.; Clifford Grobstein, Department of Biological Sciences; *Cell and Tissue Interactions in Development;* 2 years; $33,100

UNIVERSITY OF WYOMING, Laramie, Wyo.; Charles S. Thornton, Jackson Hole Biological Research Station, Moran, Wyo.; *Amphibian Limb Regeneration;* 3 years; $6,200

TEXAS AGRICULTURAL EXPERIMENT STATION, College Station, Tex.; R. O. Berry, Department of Animal Husbandry and Dairy Science; *In Vitro Culture and Low Temperature Storage of Bovine Follicular Ova;* 2 years; $6,600

TEXAS SOUTHERN UNIVERSITY, Houston, Tex.; Alberta J. Seaton, Department of Biology; *Cytological Organization of the Egg;* 1 year; $4,700

TRINITY UNIVERSITY, San Antonio, Tex.; Tom P. Sergeant, Department of Biology; *Growth Initiating Substances in "Conditioned" Media;* 2 years; $17,300

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Arthur H. Whiteley, Department of Zoology; *Physiology of Formation and Development of Eggs of Marine Invertebrates;* 2 years; $22,000

WAYNE STATE UNIVERSITY, Detroit, Mich.; Werner G. Heim, Department of Biology; *Changes in Serum Proteins During Ontogeny of Mammals;* 2 years; $15,900

WESLEYAN UNIVERSITY, Middletown, Conn.; Hubert B. Goodrich, Department of Biology; *Color Pattern Formation in Two Teleost Fish;* 1 year; $2,900

YALE UNIVERSITY, New Haven, Conn.

Edgar J. Boell, Department of Zoology; *Developmental Changes in Mitochondria;* 1 year; $7,000

John P. Trinkaus, Department of Zoology; *The Potencies of Tissue Cells;* 3 years; $19,000

EARTH SCIENCES

KURT TEICHERT, U. S. Geological Survey, Federal Center, Denver, Colo.; *Studies of Stratigraphy and Paleoecology in West Germany;* 4 months; $1,400

UNIVERSITY OF ALASKA, College, Alaska; V. P. Hessler, Geophysical Institute; *Earth Potentials;* 2 years; $13,800

AMHERST COLLEGE, Amherst, Mass.; Bruce B. Benson, Department of Physics; *Oxygen Isotope Variations in Ocean Water;* 1 year; $15,000

UNIVERSITY OF ARIZONA, Tucson, Ariz.; L. J. Battan and A. R. Kassander, Jr., Institute of Atmospheric Physics; *Seeding of Summer Cumulus Clouds;* 1 year; $22,200

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.

R. H. Jahns, Department of Geology; *Laboratory Synthesis of Pegmatite Minerals;* 2 years; $22,600

C. C. Patterson and T. J. Chow, Division of Geological Sciences; *Lead Isotopes in the Oceans;* 1 year; $10,350

W. B. Ray, Department of Geology; *High Pressure Polymorphs of Ice;* 3 years; $27,600

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

L. H. Adams and G. C. Kennedy, Institute of Geophysics, Los Angeles, Calif.; *Rapidly Running Mineral Transistions;* 1 year; $20,000

M. N. Bramlette, Department of Geology, Scripps Institution of Oceanography, La Jolla, Calif.; *Fossil Coccolithophorids;* 3 years; $29,000

Perry Byerly, Seismographic Station; *S Wave of Earthquakes;* 2 years; $3,795

R. L. Hay, Department of Geology; *Weathering and Diagenesis in the Clarno Formation;* 2 years; $10,800

W. H. Munk, Scripps Institution of Oceanography, La Jolla, Calif.; *Chandler Wobble;* 3 years; $17,250

M. A. Murphy and P. Rodda, Department of Geology, Riverside, Calif.; *Cretaceous Rocks of Northwestern Sacramento Valley;* 2 years; $14,500

M. Neiburger, Department of Meteorology, Los Angeles, Calif.; *Cloud Drop Growth;* 3 years; $64,750

George Tunell, Department of Geology, Los Angeles, Calif.; *Ore Forming Processes;* 2 years; $22,600

J. E. Tyler, Scripps Institution of Oceanography, La Jolla, Calif.; *Volume Scattering Function of Natural Waters;* 2 years; $24,000

UNIVERSITY OF CHICAGO, Chicago, Ill.

H. R. Byers, Department of Meteorology; *Detection of Ice Nucleating Agents;* 2 years; $81,000

H. R. Byers and L. J. Battan, Department of Meteorology; *Seeding of Summer Cumulus Clouds;* 1 year; $18,500

CITY COLLEGE, New York, N. Y.; C. H. Kindle, Department of Geology; *Stratigraphy and Fauna of Western Newfoundland;* 3 years; $16,800

COLUMBIA UNIVERSITY, New York, N. Y.

W. S. Broecker, Lamont Geological Observatory; *Radiocarbon Age Determinations;* 3 years; $34,000

D. B. Ericson, Lamont Geological Observatory; *Ocean Sediment Cores;* 1 year; $13,000

John Imbrie, Department of Geology; *Evolution of Common Biofacies;* 3 years; $23,800

FRANKLIN AND MARSHALL COLLEGE, Lancaster, Pa.; Donald U. Wise, Department of Geology; *Basement Structure and Tectonics in Wyoming;* 2 years; $5,000

UNIVERSITY OF HAWAII, Honolulu, T. H.; Thomas F. Bates, Department of Agronomy and Soil Science; *Parent Rock to Clay Mineral Alteration in the Hawaiian Islands;* 1 year; $2,500

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; J. B. Droste, Department of Geology, Indiana University; *Clay Minerals in Evaporite Deposits;* 2 years; $11,300

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; A. C. Waters, Department of Geology; *Iron-Bearing Layered Silicates;* 2 years; $26,000

LAWRENCE COLLEGE, Appleton, Wis.; W. F. Read, Department of Geology; *Subsurface Studies of St. Peter Sandstone;* 1 year; $900

LOS ANGELES COUNTY MUSEUM, Los Angeles, Calif.; Theodore Downs, Department of Vertebrate Paleontology; *Cenozoic Vertebrates of Imperial Valley;* 2 years; $11,000

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; G. E. Murray, Department of Geology; *Stratigraphic Studies in Northeastern Mexico;* 3 years; $24,000

UNIVERSITY OF MAINE, Orono, Maine; P. H. Osberg, Department of Geology; *Structure of Pittsford Area, Vermont;* 6 months; $350

MASSACHUSETTS INSTITUTE OF TECHNOLOGY; Cambridge, Mass.

W. F. Brace, Department of Geology and Geophysics; *Mineral Plasticity and Hardness;* 3 years; $20,000

M. J. Buerger, Department of Geology and Geophysics; *Computational Work on Crystal Structures;* 1 year; $8,000

W. H. Dennen and Ely Mencher, Department of Geology and Geophysics; *Geochemical Investigations of Sedimentary Rocks;* 1 year; $11,000

H. G. Houghton, Department of Meteorology; *The Prosecution of Atmospheric Research in the United States of America;* 18 months; $52,400

UNIVERSITY OF MIAMI, Coral Gables, Fla.

Cesare Emiliani; The Marine Laboratory; *Pleistocene Ocean Temperatures;* 2 years; $28,000

F. F. Koczy, Marine Laboratory; *Water Masses of the Straits of Florida;* 1 year; $8,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; A. N. Dingle, Department of Meteorology; *Raindrop Size Spectra;* 3 years; $40,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.

S. S. Goldich, Department of Geology and A. O. C. Nier, Department of Physics; *Radioactive Dating by K40/A40 Method;* 2 years; $39,000

F. M. Swain, Department of Geology; *Bituminous Deposits;* 1 year; $10,250

H. E. Wright, Jr., Department of Geology; *Pleistocene Limnology;* 2 years; $17,000

MONTANA STATE UNIVERSITY, Missoula, Mont.; John Hower, Jr., Department of Geology; *Genesis of Glauconite;* 2 years; $16,500

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D. C.; William R. Thurston, Division of Earth Sciences; *A Study of the Feasibility and Desirability of Drilling a Hole to the Mohorovicic Discontinuity;* 1 year; $15,000.

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; H. F. McMurdie; *Silver Iodide Studies;* 1 year; $20,000

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Virgil I. Mann, Department of Geology; *Gravity Survey in North Carolina;* 2 years; $9,200

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; C. G. Dodd, Department of Petroleum Engineering, University of Oklahoma; *Clay Mineral Surface Chemistry;* 2 years; $20,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.

G. W. Brindley, Department of Ceramic Technology; *Thermal Reactions in Ceramic Systems;* 3 years; $34,000

Robert N. Clayton, Department of Geochemistry; *Extraction of Oxygen for Isotopic Analysis;* 1 year; $4,000

Rustum Roy, Department of Geochemistry; *Phase Rule in Subsolidus State Reactions;* 3 years; $24,500

J. V. Smith, Department of Minerology and Petrology; *The Minerology of the Amphiboles;* 2 years; $15,700

O. F. Tuttle, Division of Earth Sciences; *Weight Losses at High Temperatures and Pressures;* 1 year; $7,300

O. F. Tuttle, Division of Earth Sciences; *Melting Temperatures of Silicates;* 1 year; $10,000

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; E. K. Ralph, Department of Physics; *Carbon 14 Half-Life;* 1 year; $2,500

PRINCETON UNIVERSITY, Princeton, N. J.

William E. Bonini, Department of Geological Engineering; *Seismic Study of Faulting Along the Beartooth Front;* 2 years; $16,350

Franklyn B. Van Houten, Department of Geology; *Sedimentology and Paleomagnetism of the Brunswick Shale and Lockatong Argillite;* 2 years; $14,000

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; Samuel Katz, Department of Geophysics; *Elastic Constants and Density at High Pressure and Temperature;* 6 months; $3,450

TEXAS AGRICULTURAL AND MECHANICAL RESEARCH FOUNDATION, College Station, Tex.

Richard G. Bader, Department of Oceanography and Meteorology; *Bathymetry and Sediments of the Bay of Campeche;* 1 year; $5,000

D. W. Hood, Department of Oceanography and Meteorology; *Calcium Carbonate Solubility Equilibrium in Sea Water;* 1 year; $10,000

UNIVERSITY OF TEXAS, Austin, Tex.; Edward C. Jonas, Department of Geology; *Effect of Brackish-Water Organisms;* 2 years; $12,300

UNIVERSITY OF UTAH, Salt Lake City, Utah.

J. W. Berg, Jr. and K. L. Cook, Department of Geophysics; *Deep Seismic Refraction Studies;* 1 year; $11,000

K. L. Cook and J. W. Berg Jr., Department of Geophysics; *Geophysical Studies in Utah and Nevada;* 2 years; $32,500

WASHINGTON AND LEE UNIVERSITY, Lexington, Va.; E. W. Spencer, Department of Geology; *Deformation of Madison Range, Montana;* 3 years; $16,000

WASHINGTON UNIVERSITY, St. Louis, Mo.; H. N. Andrews, Jr., Henry Shaw School of Botany; *Paleozoic Plants;* 3 years; $10,250

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; C. D. Campbell, Department of Geology; *Magnetization of Basalt Lavas;* 1 year; $6,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.; T. G. Thompson, Department of Oceanography; *Organic Compounds in Sea Water;* 2 years; $15,500

UNIVERSITY OF WISCONSIN, Madison, Wis.; H. H. Lettau, Department of Meteorology; *Convective Energy Transfer;* 15 months; $22,000

YALE UNIVERSITY, New Haven, Conn.

K. K. Turekian, Department of Geology; *Crustal Abundance of Nickel, Cobalt and Chromium;* 2 years; $19,900

K. M. Waage, Department of Geology; *Cephalopod Faunas of Fox Hills Formation;* 3 years; $8,700

ECONOMIC SCIENCES

ANTIOCH COLLEGE, Yellow Springs, Ohio; Julian H. Blau, Department of Mathematics; *Mathematical Economics;* 3 years; $10,500

UNIVERSITY OF CHICAGO, Chicago, Ill.; Zvi Griliches, Department of Economics; *Econometric Investigations of Technological Change;* 2 years; $16,800

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Jacob Schmookler, School of Business Administration; *The Economics of Invention;* 2 years; $19,000

NATIONAL BUREAU OF ECONOMIC RESEARCH, New York, N. Y.; Millard Hastay; *Use of Computers in Economic Analysis;* 2 years; $40,000

ENGINEERING SCIENCES

ALFRED UNIVERSITY, Alfred, N. Y.; Charles H. Greene, Department of Glass Technology, New York State College of Ceramics; *Distribution and Nature of Flaws in Glass;* 2 years; $22,000

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; George W. Housner and Donald E. Hudson, Division of Engineering; *Local Ground Motions of Strong-Motion Earthquakes;* 3 years; $25,300

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Werner Godsmith and Don M. Cunningham, Department of Engineering Design; *Investigation of Penetration;* 2 years; $21,800

W. D. Hershberger, Department of Engineering, Los Angeles, Calif.; *Paramagnetic Resonance and the "Maser" Principle;* 3 years $43,300

Ralph Hultgren, Department of Mineral Technology; *Heat Capacity of Alloys;* 3 years; $25,000

J. W. Johnson, Department of Engineering; *Waves Generated by a Moving Pressure Area;* 2 years; $15,900

R. S. Seban, Department of Mechanical Engineering, Institute of Engineering Research; *Heat Transfer From a Flat Plate;* 2 years, $25,500

C. J. Vogt, Department of Mechanical Engineering; *Liquid Hydrocarbons at Elevated Temperatures and Pressures;* 1 year; $7,800

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Robert F. Mehl, Metals Research Laboratory; *Recovery and Recrystallization Characteristics of High Purity Iron;* 2 years; $17,600

CENTRAL INSTITUTE FOR THE DEAF, St. Louis, Mo.; Jerome R. Cox, Jr.; *The Production of Acoustic Transients;* 2 years, $21,300

COLORADO STATE UNIVERSITY, Fort Collins, Colo.

Jack E. Cermak, Department of Civil Engineering; *Atmospheric Surface Layer Phenomena;* 2 years; $28,000

A. T. Corey, Department of Civil Engineering; *Distribution of Fluid Phases in a Porous Field;* 1 year; $8,000

COLUMBIA UNIVERSITY, New York, N. Y.; Elmer L. Gaden, Jr., Department of Chemical Enginering; *Kinetics of Fermentation Processes;* 3 years; $32,500

UNIVERSITY OF FLORIDA, Gainesville, Fla.

Ralph W. Kluge, Department of Civil Engineering; *Torsional Strength of Prestressed Concrete;* 2 years; $10,600

Frank E. Richart, Department of Civil Engineering; *Arching in Granular Elastic Media;* 1 year; $7,400

John H. Schmertmann, Department of Civil Engineering; *Shear Strength of Clays;* 1 year; $9,600

GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Ga.; Charles W. Gorton, School of Mechanical Engineering; *Velocity Profiles in Non-Isothermal Flow;* 2 years; $6,500

HARVARD UNIVERSITY, Cambridge, Mass.; R. W. P. King, Department of Engineering & Applied Physics; *Electrohydrodynamics and Related Phenomena;* 2 years; $17,200

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.

Lloyd H. Donnell, Department of Mechanics; *Large Shell Displacement Theory;* 2 years; $8,400

August J. Durelli, Department of Civil Enginering; *Embedded Grid Method of Stress Analysis;* 2 years; $16,500

Philip G. Hodge, Jr., Department of Mechanics; *Theory of Piecewise Linear Plasticity;* 2 years; $28,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Clyde E. Kesler, Department of Theoretical and Applied Mechanics; *Accumulative Fatigue Damage in Concrete;* 3 years; $63,000

Ralph Peck, Department of Civil Engineering; *Illite and Illitic Soils;* 2 years; $16,500

STATE UNIVERSITY OF IOWA; Iowa City, Iowa; Hunter Rouse, Institute of Hydraulic Research, *Irrotational Flow at Weirs and Conduit Outlets;* 2 years; $8,400

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.

Stanley Corrsin; Department of Mechanical Engineering; *Motion of Particles in Turbulent Flow;* 2 years; $15,000

Stanley Corrsin, Department of Mechanical Engineering; *Isotropic Turbulence;* 5 years; $66,000

S. K. Friedlander, Department of Chemical Engineering; *Chemical Reactions in Flowing Aqueous Solutions;* 2 years; $16,900

MARQUETTE UNIVERSITY, Milwaukee, Wis.; Richard C. Kolf, Department of Engineering; *Vorticity in Horizontal Orifice Flow;* 2 years; $12,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.

Alan S. Michaels, Department of Chemical Engineering; *Gas Transmission Through Polymer Films;* 2 years; $13,000

Edwin R. Gilliland and Raymond F. Baddour, Department of Chemical Engineering; *Flow of Gases Through Microporous Solids;* 2 years; $19,000

Warren M. Rohsenow, Department of Mechanical Engineering; *Mechanism of Gaseous Freeze-Out Processes;* 2 years; $14,800

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

Lloyd L. Kempe, Department of Chemical Engineering; *The Effects of Agitation on Mass Transfer in Aerobic Fermentation;* 2 years; $7,500

Gordon J. Van Wylen, Department of Mechanical Engineering; *Limit Line of Superheated Nitrogen Vapor;* 2 years; $16,900

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.

W. F. Brown, Department of Electrical Engineering; *Rigorous Calculation of Ferromagnetic Microstructure;* 2 years; $25,000

James P. Hartnett, Department of Mechanical Engineering; *Free Convection of Liquid Metals;* 2 years; $10,800

Robert F. Lambert, Department of Electrical Engineering; *Sound Propagation in Moving Media;* 2 years; $16,800

Edgar L. Piret, Department of Chemical Engineering; *Crushing and Grinding Energetics;* 2 years; $19,900

UNIVERSITY OF MISSOURI, Columbia, Mo.

George B. Clark, Department of Mining Engineering, School of Mines and Metallurgy, Rolla, Mo.; *Stresses in Heterogeneous Geological Bodies Under Gravitational Forces;* 3 years; $29,000

Donald L. Waidelich, Department of Electrical Engineering; *Impedance and Equivalent Circuit of a Probe Coil Near a Plane Conductor;* 2 years; $14,400

MONTANA STATE COLLEGE, Bozeman, Mont.

Lewis G. Mayfield, Department of Chemical Engineering; *Kinetics of Destructive-Hydrogenation of Quinoline;* 2 years; $11,500

Donald K. Weaver, Jr., Electrical Engineering; *Quadrature Signal Functions;* 1 year; $5,100

NEW YORK UNIVERSITY, New York, N. Y.

John Happel, Department of Chemical Engineering; *Catalytic Vapor Phase Dehydrogenation of N-Butane;* 2 years; $17,400

Polykarp Herasymenko, Metallurgical Laboratory; *Titanium-Aluminum and Titanium-Manganese Alloys;* 2 years; $18,800

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; J. F. Lee, Department of Mechanical Engineering; *Condensation Shock;* 2 years; $22,800

NORTHWESTERN UNIVERSITY, Evanston, Ill.

J. O. Brittain, Department of Metallurgy; *Imperfections of Metals at Elevated Temperatures;* 2 years; $25,400

D. F. Mason and George Thodos, Department of Chemical Engineering; *Studies in the Critical Region for Pure Components and Mixtures;* 2 years; $20,500

J. M. Smith, Department of Chemical Engineering; *Heat Transfer, Mass Transfer and Chemical Reaction in Flowing Gas;* 3 years; $16,800

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.

O. K. Crosser, Department of Chemical Engineering, University of Oklahoma; *Thermal Conductivity of Saturated Liquids and Vapors;* 2 years; $8,800

C. M. Sliepcevich, Department of Chemical Engineering, University of Oklahoma; *Dynamic Response Characteristics of a Continuous, Agitated Reactor;* 3 years; $25,000

OREGON STATE COLLEGE, Corvallis, Oreg.; James G. Knudsen, Department of Chemical Engineering; *Heat Transfer and Flow Characteristics of Two Immiscible Liquids;* 3 years; $22,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.

Arthur Rose, Department of Chemical Engineering; *Vapor-Liquid Equilibrium and Distillation of Fatty Acids, Esters and Alcohols;* 2 years; $16,600

A. W. Taylor, Department of Ceramic Technology; *Influence of Wetting Agents on Clays;* 2 years; $9,100

George J. Young, Department of Fuel Technology; *Adsorption in the Carbon-Water System;* 3 years; $16,600

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; J. G. Bassett, Department of Metallurgical Engineering; *Behavior of Hydrogen in Steel;* 2 years; $23,800

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; Ernst Weber, Vice President for Research; *The Linear Algebra and Topology of Kirchoff Networks and Switching Circuits;* 15 months; $10,400

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

Leslie C. Case, Department of Chemical Engineering, Purdue University; *Cross Linking in Elastomers;* 3 years; $14,500

R. J. Grosh, Department of Mechanical Engineering, Purdue University; *Theory of Moving Heat Sources;* 2 years; $18,000

George A. Hawkins, Director, Engineering Experiment Station; *Conceptual Study of a Nuclear Research Reactor;* 1 year; $30,000

G. A. Leonards, Department of Soil Mechanics; *Consolidation Characteristics of Artificially Sedimented Clays;* 2 years; $8,700

G. A. Leonards, Department of Civil Engineering; *Freezing Phenomena in Fine-Grained Soils;* 2 years; $15,400.

J. C. Samuels, Department of Engineering Sciences; *Properties of Stochastic Systems;* 3 years; $20,200

J. L. Waling, Department of Civil Engineering, Purdue University; *Dynamic Response of Reinforced Concrete Slabs;* 3 years; $36,800

ROCKY MOUNTAIN HYDRAULIC LABORATORY, Allenspark, Colo.; R. W. Powell and C. J. Posey; *Open Channel Flow Research;* 2 years; $9,800

STANFORD UNIVERSITY, Stanford, Calif.

Stephen J. Kline, Department of Mechanical Engineering; *Flow Models in Turbulent Boundary Layers;* 2 years; $22,900

Ray K. Linsley, Department of Civil Engineering; *Characteristics of Streamflow Hydrographs for Small Drainage Basins;* 2 years; $20,000

William H. Schwarz, Department of Chemistry; *Turbulent Mixing;* 2 years; $21,300

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J.; Sidney F. Borg, Department of Civil Engineering; *Wedge Entry Into a Conical Viscous Fluid;* 1 year; $6,800

SYRACUSE UNIVERSITY, Syracuse, N. Y.

E. E. Drucker and K. N. Tong, Mechanical Engineering Department; *Thermodynamic Behavior of Initially Saturated Vapors;* 2 years; $22,700

C. S. Grove, Department of Chemical Engineering; *Mass Transfer in Liquid Metal Systems;* 2 years; $16,900

TEXAS AGRICULTURAL AND MECHANICAL RESEARCH FOUNDATION, College Station, Tex.; Warren Rice, Department of Mechanical Engineering; *Transfer Coefficients in the Turbulent Boundary Layer;* 2 years; $17,300

UNIVERSITY OF TEXAS, Austin, Tex.

David M. Himmelblau, Department of Chemical Engineering; *Study of Ionization Constants Using Radioactive Tracers;* 2 years; $11,000

Kenneth A. Kobe, Department of Chemical Engineering; *Solubility of Gases in Liquids;* 3 years; $13,300

Enrico Volterra, Department of Engineering Mechanics; *Internal Constraints Applied to Dynamic Problems;* 2 years; $19,000

UNIVERSITY OF VERMONT, Burlington, Vt.; Arthur R. Eckels, Department of Electrical Engineering; *Feedback Techniques in Electroballistocardiography;* 1 year; $5,200

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; J. O. Outwater, Mechanical Engineering Department; *Fiber Reinforced Materials;* 2 years; $14,900

UNIVERSITY OF WASHINGTON, Seattle, Wash.

Morris E. Childs, Department of Mechanical Engineering; *Turbulent Two-Dimensional Jet Mixing;* 2 years; $17,900

A. E. Harrison, Department of Electrical Engineering; *Traveling-Wave Microwave Tubes—Modulation Characteristics;* 2 years; $22,800

UNIVERSITY OF WISCONSIN, Madison, Wis.; Vincent C. Rideout, Department of Electrical Engineering; *Computer Correlation of Linear and Nonlinear Systems;* 3 years; $44,200

YALE UNIVERSITY, New Haven, Conn.; Robert B. Gordon, Department of Metallurgy; *Plasticity of Ionic Crystals;* 2 years; $15,500

ENVIRONMENTAL BIOLOGY

UNIVERSITY OF ALASKA, College, Alaska; Laurence Irving, Biologist; *Adaptation to Cold in Arctic Inhabitants;* 1 year; $17,300

AMERICAN GEOGRAPHICAL SOCIETY, New York, N. Y.; Calvin J. Heusser; *Radiocarbon Dating of Peats;* 1 year; $2,900

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.

Jack McCormick; *Vegetation of the Chiricahua Mountains;* 3 years; $20,000

Richard G. Zweifel, Department of Amphibians and Reptiles; *Embryonic Temperature Adaptation in Anurans;* 3 years; $5,500

UNIVERSITY OF ARIZONA, Tucson, Ariz.

E. Lendell Cockrum, Department of Zoology; *Biology of Southwestern Chiropterans;* 3 years; $18,900

Robert R. Humphrey, Department of Agronomy and Range Management; *Analysis of Annual Ring Patterns in Desert Shrubs;* 3 years; $36,600

Terah L. Smiley, Geochronology Laboratories; *Postglacial Pollen Sequence in the Southwest;* 2 years; $32,600

BOWDOIN COLLEGE, Brunswick, Maine

Charles E. Huntington, Department of Biology; *Mortality and Reproductive Rates in Ocenodroma;* 5 years; $17,900

James M. Moulton, Department of Biology; *Relations of Sound to Behavior of Fishes;* 2 years; $12,000

BRADFORD JUNIOR COLLEGE, Bradford, Mass.; Norman S. Bailey, Department of Natural Sciences; *Bio-Ecological Studies of New England Tingidae;* 2 years; $5,300

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

William L. Belser, Scripps Institution of Oceanography, La Jolla Calif.; *Bioassay Technique for Organic Materials in Sea Water;* 2 years; $10,000

Brian P. Boden, Scripps Institution of Oceanography, La Jolla; *Sonic-Scattering Layer Research;* 1 year; $2,000

Theodore H. Bullock, Department of Zoology, Los Angeles, Calif.; *Physiological Ecology of Marine Invertebrates;* 1 year; $5,600

Wilbur W. Mayhew, Division of Life Sciences Riverside, Calif.; *Climatic Stress Effects on Desert Vertebrates;* 3 years; $15,200

Robert H. Parker, Scripps Institute of Oceanography, La Jolla, Calif.; *Marine Macro-Invertebrate Zoogeography as Related to Depositional Environments;* 2 years; $11,600

Fred B. Phleger, Scripps Institution of Oceanography, La Jolla, Calif.; *Foraminifera and Sedimentology;* 3 years; $39,900

CARLETON COLLEGE, Northfield, Minn.; J. Bruce Guyselman, Department of Zoology; *Persistent Rhythms of Locomotor Activity in Crustaceans;* 2 years; $5,700

COLORADO STATE UNIVERSITY, Fort Collins, Colo.

Robert R. Lechleitner, Department of Zoology; *Distributional Ecology of Cynomys;* 3 years; $14,900

Richard T. Ward, Department of Botany and Plant Pathology; *Ecology of Reproduction in Fagus Grandifolia;* 2 years; $4,000

UNIVERSITY OF COLORADO, Boulder, Colo.; Gordon Alexander, Department of Biology; *Influence of Altitude Upon Orthoptera;* 3 years; $20,100

CORNELL UNIVERSITY, Ithaca, N. Y.; Lamont C. Cole, Department of Zoology; *Effects of Movements on Rodent Population Structure;* 2 years; $13,900

DUKE UNIVERSITY, Durham, N. C.

W. Dwight Billings, Department of Botany; *Alpine Vegetation in Relation to Soil Development and Snow Patterns;* 2 years; $3,000

C. G. Bookhout, Department of Zoology; *Environmental Influences in the Development of Balanus Nauplii;* 3 years; $26,000

F. John Vernberg, Department of Zoology; *Comparative Ecology of Tropical and Temperate Zone Crustaceans;* 1 year; $5,400

EARLHAM COLLEGE, Richmond, Ind.; James B. Cope, Department of Biology; *Distribution, Migration and Orientation of Chiropterans;* 3 years; $17,300

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; A. W. Ziegler, Department of Biological Sciences; *Factors Influencing Seasonal Occurrence of Water Fungi;* 2 years; $9,500

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Archie Carr, Department of Marine Chelonia; *Reproductive Ecology of Marine Chelonia;* 2 years; $15,500

UNIVERSITY OF HAWAII, Honolulu, T. H.

Henry A. Bess, Department of Zoology and Entomology; *Insect Population Dynamics;* 2 years; $12,200

Leonard D. Tuthill, Director of Research; *Biology of Marine Midges;* 1 year; $4,700

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Lawrence C. Bliss, Department of Botany; *Productivity of Alpine Plant Communities;* 2 years; $5,100

S. Charles Kendeigh, Department of Zoology; *Physiology and Ecology of Certain Sub-Arctic and Tropical Fauna;* 1 year; $7,300

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; Paul L. Errington, Department of Zoology and Entomology; *Population Phenomena in Higher Vertebrates;* 1 year; $6,000

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; G. Edgar Folk, Jr., Department of Physiology; *Influence of Environmental Factors on Mammalian Activity Rhythms;* 2 years; $11,100

UNIVERSITY OF KANSAS, Lawrence, Kans.; A. W. Kuchler, Department of Geography; *Natural Vegetation of the United States;* 3 years; $36,500

KENTUCKY RESEARCH FOUNDATION UNIVERSITY STATION, Lexington, Ky.; Richard C. Dugdale, Department of Zoology, University of Kentucky; *Nutrient Supply of Certain Alaska Lakes;* 1 year; $8,100

L. S. HATHEWAY SCHOOL OF CONSERVATION, South Lincoln, Mass.; William H. Drury, Jr., Director; *Activity Patterns and Migration;* 3 years; $13,000

MACALESTER COLLEGE, St. Paul, Minn.; Waldo S. Glock, Department of Geology; *Tree Growth and Rainfall;* 3 years; $8,500

UNIVERSITY OF MAINE, Orono, Maine; George M. Woodwell, Department of Botany; *Upland Deciduous Forests of Maine;* 2 years; $2,600

MARQUETTE UNIVERSITY, Milwaukee Wis.; Ralph L. Dix, Department of Biology; *Phytosociological Study of Grasslands;* 3 years; $13,000

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Samuel P. Meyers, Marine Laboratory; *Marine Yeasts of Biscayne Bay;* 1 year; $5,300

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.

G. W. Prescott, Department of Botany; *Ecological Factors in the Distribution of Tropical Algae;* 1 year; $19,200

George C. Williams, Department of Natural Sciences; *Movements of Early Stages of Marine Fishes;* 1 year; $4,200

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

W. S. Benninghoff, Department of Botany; *Phytosociological Survey in Michigan;* 3 years; $23,500

L. B. Slobodkin, Department of Zoology; *Predation, Immigration, and Environmental Variation in Laboratory Populations;* 2 years; $23,600

UNIVERSITY OF MISSOURI, Columbia, Mo.; W. H. Elder, Department of Zoology; *Population Dynamics of* Myotis *Species;* 2 years; $6,700

MONTANA STATE UNIVERSITY, Missoula, Mont.; Richard D. Taber, School of Forestry, and Robert S. Hoffman, Department of Zoology; *Ecology of Alpine Communities;* 3 years; $13,000

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; C. Clayton Hoff, Department of Biology; *Pseudoscorpions of the Rocky Mountain Region;* 2 years; $4,400

NEW YORK ZOOLOGICAL SOCIETY, New York, N. Y.; William Beebe, Department of Tropical Research; *Biology of Tropical Avifauna;* 3 years; $16,200

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; William E. Fahy, Institute of Fisheries Research; *Meristic Structures in Fishes;* 3 years; $19,600

NORTH DAKOTA STATE COLLEGE, Fargo, N. Dak., Gabriel W. Comita, Department of Zoology and Physiology; *Life Cycle of a Cyclopoid Copepod;* 2 years; $4,800

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Paul B. Kannowski, Department of Biology; *Ant Distribution in Relation to Environmental Factors;* 2 years; $5,400

RESEARCH FOUNDATION, Oklahoma State University of Agriculture and Applied Science, Stillwater, Okla.; Troy C. Dorris, Department of Zoology, Oklahoma State University; *Productivity of an Aquatic Community;* 1 year; $4,000

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla; Elroy L. Rice and

William T. Penfound, Department of Plant Sciences, University of Oklahoma, *Microclimate of Devils Canyon;* 1 year; $15,100

OREGON STATE COLLEGE, Corvallis, Oreg.

H. Irgens-Moller, Agricultural Experiment Station; *Ecotype Variation in Douglas-Fir;* 3 years; $12,400

Robert M. Storm, Department of Zoology; *Herpetofauna of a Primitive Forest;* 2 years; $6,500

UNIVERSITY OF OREGON, Eugene, Oreg.

Peter W. Frank, Department of Biology, *Analysis of Predictions of Population Numbers;* 2 years; $9,000

R. W. Morris, Department of Biology; *Environmental Relationships of Some Marine Cottid Fishes;* 3 years; $15,500

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Durward L. Allen, Department of Forestry and Conservation; *Ecology of Canis Lupus;* 3 years; $11,800

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; John G. New, Science Department, State University Teachers College, Oneonta, N. Y.; *Life History of* Percini Peltata Peltata (*Stauffer*); 2 years; $2,200

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; George K. Reid, Department of Zoology; *Effects of Conservation Measures Upon Stream Ecology;* 2 years; $12,200

COLLEGE OF ST. THOMAS, St. Paul, Minn.; Lester J. McCann, Department of Biology; *Bird Distribution and Nutrition;* 1 year; $1,100

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.

Robert M. Chew, Department of Biology; *Energy Metabolism and Water Balance of a Desert Community;* 2 years; $10,700

Louis C. Wheeler, Department of Biology; *Absorption of Certain Cations by Plants;* 3 years; $20,200

STANFORD UNIVERSITY, Stanford, Calif.; Walter C. Brown, Department of Biological Sciences; *Herpetofauna of Philippine Tropical Forests;* 3 years; $12,100

TEXAS TECHNOLOGICAL COLLEGE, Lubbock, Tex.; William W. Milstead, Department of Biology; *Interrelationships of Canyon Lizard Species;* 3 years; $5,300

UNIVERSITY OF TEXAS, Austin, Tex.

Louis S. Kornicker, Institute of Marine Science, Port Aransas, Tex.; *Living Ostracods in Texas Bays;* 2 years; $14,000

Bassett Maguire, Jr., Department of Zoology; *Dispersal and Colonization by Small Aquatic Organisms;* 3 years; $8,000

UNIVERSITY OF UTAH, Salt Lake City, Utah

Walter P. Cottam, Department of Botany; *Phytosociological Study of the Wasatch Range;* 3 years; $16,000

Albert W. Grundmann, Department of Zoology and Entomology; *Parasitism of Isolated Rodent Populations;* 2 years; $8,000

UTAH STATE UNIVERSITY, Logan, Utah; William F. Sigler, Department of Wildlife Management; *Population Dynamics of Small Benthic Fish;* 3 years; $22,500

UNIVERSITY OF WISCONSIN, Madison, Wis.

P. R. Morrison and J. C. Neess, Department of Ecology; *Field Investigations in Physiological Ecology;* 1 year; $3,900

J. C. Neess and W. G. Reeder, Department of Zoology; *Soils and the Distribution of Small Animals;* 1 year; $4,000

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.

John W. Kanwisher; *Energy Requirements of Marine Bottom Communities;* 2 years; $17,900

Gordon Riley; *Productivity of the Benthos of Coastal Waters;* 3 years; $26,700

UNIVERSITY OF WYOMING, Laramie, Wyo.; Garth S. Kennington, Jackson Hole Biological Research Station; *High Altitude Animal Physiology;* 3 years; $4,600

YALE UNIVERSITY, New Haven, Conn.; Edward S. Deevey, Osborn Zoological Laboratory; *Animal and Plant Microfossils in Lake Sediments;* 2 years; $14,000

GENETIC BIOLOGY

ALABAMA POLYTECHNIC INSTITUTE, Auburn, Ala.; John S. Mecham, Department of Zoology-Entomology; *Genetical and Ecological Relationships of Closely Related Species of Hylid Amphibians;* 1 year; $2,500

ARLINGTON STATE COLLEGE, Arlington, Tex.; W. F. Pyburn, Department of Biology; *Variation in Distribution of Vertebral Stripe Color Gene Frequencies in Cricket Frogs;* 2 years; $7,000

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; Howard C. Stutz, Department of Botany; *Cytogenetic Studies of Secale L. and Related Grasses;* 2 years; $10,000

CALIFORNIA BOTANICAL SOCIETY, Davis, Calif.; Marion S. Cave, Department of Botany, University of California, Berkeley, Calif.; *Index to Plant Chromosome Numbers;* 1 year; $2,100

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

R. W. Allard, Department of Agronomy, Davis, Calif.; *Quantitative Genetics;* 3 years; $20,000

Spencer W. Brown, Department of Genetics; *Cytology of State Insects;* 2 years; $11,500

Gerald E. McClearn, Department of Psychology; *Genetic Determination of Learning Phenomena;* 2 years; $14,000

Curt Stern, Department of Zoology; *Developmental Genetics of Drosophila Melanogaster;* 2 years; $18,000

Frank C. Vasek, Department of Life Sciences, Riverside, Calif.; *Cytogenetics of Clarkia Exilis;* 2 years; $6,700

DICKINSON COLLEGE, Carlisle, Pa.; Daniel J. McDonald, Department of Biology; *Deleterious Mutations in Populations of Tribolium Confusum;* 18 months; $2,500

EMORY UNIVERSITY, Emory University Ga.; Charles Ray, Jr., Department of Biology, *Cytogenetic Studies of Tetrahymena Pyriformis;* 2 years; $13,500

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; A. Gib DeBusk, Department of Biological Sciences; *Enzymes and Enzyme Systems in Mutation;* 1 year; $9,200

HARVARD UNIVERSITY, Cambridge, Mass.

Paul C. Mangelsdorf, Department of Biology; *Cytogenetics of Mutations in Maize-Teosinte Hybrids;* 2 years; $11,900

Ernst Mayr, Department of Zoology; *Analysis of Variation in Two Marine Intertidal Organisms;* 2 years; $21,000

HAVERFORD COLLEGE, Haverford, Pa.; Irving Finger, Biology Department; *Genetic Control of the Immobilisation Antigens of* Paramecium Aurelia; 2 years; $12,000

INDIANA UNIVERSITY, Bloomington, Ind.; R. R. Humphrey, Department of Zoology, *Lethal and Sublethal Traits in the Mexican Axoltl;* 3 years; $5,600

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.

Ronald R. Cowden, Department of Biology, *Nuclear Ribosenucleic Acid;* 2 years; $7,000

P. E. Hartman, Department of Biology; *Mutability in Salmonella Typhimurium;* 3 years; $8,800

Carl P. Swanson, Department of Botany; *Metabolic Factors in Mutagenic Systems;* 3 years; $19,400

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Herbert Parkes Riley, Department of Botany, University of Kentucky; *Cytology and Evolution in South African Plants;* 2 years; $6,000

LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; A. Sokoloff; *Phenotypic Variation in Natural Populations of* Drosophila; 2 years; $9,500

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Robert R. Miller, Department of Zoology, *Speciation in the Genus Poeciliopsis;* 3 years; $19,000

MINNEAPOLIS WAR MEMORIAL BLOOD BANK, Minneapolis, Minn.; G. Albin Matson, Director; *Study of Hereditary Blood Factors;* 1 year; $10,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.

Joseph G. Gall, Department of Zoology, *Structural and Chemical Features of Animal Cell Nuclei;* 2 years; $16,900

David J. Merrell, Department of Zoology; *Dominant Bernsi Mutation in Natural Populations of Rana Pipiens;* 3 years; $7,500

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; Edgar Anderson, Department of Genetics; *Introgression in Wild and Cultivated Plants;* 3 years; $17,000

UNIVERSITY OF MISSOURI, Columbia, Mo.; E. H. Coe, Jr., Department of Field Corps; *Gene Action in Maize;* 2 years; $8,000

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.

D. U. Gerstell & L. L. Phillips, Department of Field Crops; *Artificial Amphidiploids in the Genera Gossypium and Nicotiana;* 3 years; $17,000

H. F. Robinson and C. Clark Cockerham, Institute of Statistics; *Quantitative Genetics Research in Drosophila;* 3 years; $32,000

Ben W. Smith, Division of Biological Sciences; *The Relation of Dioecious Sexual Reproduction to the Natural Occurrence of Polyploidy;* 3 years; $24,000

OHIO STATE UNIVERSITY, Columbus, Ohio; Henry L. Plaine, Department of Zoology and Entomology; *Induction of Uncontrolled Growths by Specific Genes in* Drosophila; 2 years; $11,500

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.

J. S. Gots, Department of Microbiology; *Gene-Enzyme Interactions in Bacteria;* 8 years; $28,900

P. W. Whiting, Department of Zoology; *Cytological and Morphological Study of the Wasp;* 2 years; $4,600

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Ellis Englesberg, Department of Biological Sciences; *Genetics and Physiology of the Diauxic Phenomenon and "Active Transport" in Bacteria;* 2 years; $28,500

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

A. E. Bell, Department of Poultry Sciences, Purdue University; *Theoretical Concepts in Quantitative Genetics;* 3 years; $40,000

Jules Janick, Department of Horticulture, Purdue University; *Genetics of Sex Determination;* 2 years; $8,500

Oliver R. Nelson, Department of Botany and Plant Pathology, Purdue University; *Genetic Fine Structure;* 2 years; $10,000

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; A. H. Doermann, Department of Biology; *Genetics of Bacterial Viruses;* 1 year; $3,000

SANTA BARBARA BOTANIC GARDEN, Santa Barbara, Calif.; Marta S. Walters; *Chromosome Distribution and Spindle Behavior in Interspecific Hybrids of* Bromus; 2 years; $14,000

SOUTH DAKOTA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Brookings, S. D.; James G. Ross, Agronomy Department; *Formation of Homozygous Diploid Mutants in Sorghum;* 2 years; $22,100

STANFORD UNIVERSITY, Stanford, Calif.; Charles Yanofsky, Department of Biological Sciences; *Genetic Control of Enzyme Formation;* 18 months; $16,600

UNIVERSITY OF TEXAS, Austin, Tex.

A. C. Faberge, Department of Zoology, *Chromosome and Nuclear Structure;* 1 year; $2,300

T. C. Hsu, Anderson Hospital and Tumor Institute, Houston, Tex.; *Mammalian Chromosomes in Vivo and in Vitro;* 2 years; $10,350

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Stanley M. Gartler, Department of Medicine; *Human Biochemical Genetics Utilizing Twins;* 1 year; $8,500

WESLEYAN UNIVERSITY, Middletown, Conn.; Ernst Caspari, Department of Biology; *Genetic Control of Competence for Pigment Formation;* 2 years; $10,000

UNIVERSITY OF WISCONSIN, Madison, Wis.

R. Alexander Brink, Department of Genetics; *Invariable Genetic Change of the R^r Gene in Maize;* 3 years; $26,800

Arthur B. Chapman and N. E. Morton, Department of Genetics; *Statistical Analysis in Genetics;* 2 years; $10,700

James F. Crow, Department of Genetics; *Genetic Analysis of DDT Resistant Drosophila;* 1 year; $1,500

WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA, Philadelphia, Pa.; Max Levitan, Department of Anatomy; *Population Dynamics of Linked Chromosomal Variants;* 3 years; $5,900

YALE UNIVERSITY, New Haven, Conn.

Norman H. Giles, Department of Botany; *Genetic Control of Adenine Biosynthesis;* 2 years; $12,000

Earl D. Hanson, Department of Zoology; *Nucleocytoplasmic Interaction;* 2 years; $12,800

HISTORY AND PHILOSOPHY OF SCIENCE

AMERICAN UNIVERSITY OF BEIRUT, Beirut, Lebanon; E. S. Kennedy, Department of Mathematics; *History of Islamic Astronomy;* 2 years; $12,600

COLUMBIA UNIVERSITY, New York, N. Y.; Helmut de Terra, Department of History; *Early American Science;* 1 year, $3,500

EARLHAM COLLEGE, Richmond, Ind.; Otto T. Benfey, Department of Chemistry; *Development of Structural Theory in Organic Chemistry;* 3 years; $3,700

UNIVERSITY OF FLORIDA, Gainesville, Fla.; James A. Olson, Department of Biochemistry; *Historical Study in Italian Science;* 1 year; $700

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Giorgio de Santillana, Department of Humanities; *Development of Physics;* 1 year; $8,700

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Herbert Feigl, Minnesota Center for Philosophy of Science; *Philosophical Foundation of Physics;* 1 year; $14,300

PALO ALTO MEDICAL RESEARCH FOUNDATION, Palo Alto, Calif.; Charles D. O'Malley, Department of History; *Origins of Modern Anatomy and Physiology;* 1 year; $5,700

MATHEMATICAL SCIENCES

JAN G. VAN DER CORPUT, UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Asymptotic Expansions;* 2 years; $30.400

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.; Tibor Rado, Chairman; *Summer Research Institute in Surface Area Theory;* 6 weeks; $30,000

UNIVERSITY OF BRITISH COLUMBIA, Vancouver, Canada; Marvin Marcus, Department of Mathematics; *Doubly Stochastic Matrices;* 2 years; $4,700

BROWN UNIVERSITY, Providence, R. I.; W. S. Massey and D. A. Buchsbaum, Department of Mathematics; *Algebraic Topology and Homological Algebra;* 3 years; $35,200

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

William G. Bade and Frantisek Wolf, Department of Mathematics; *Theory and Application of Operators;* 2 years; $30,500

David Blackwell, E. L. Lehmann, Michel Loève, Jerzy Neyman, and Henry Scheffé, Department of Statistics; *Research in Mathematical Statistics and Probability;* 2 years; $30,000

Earl A. Coddington, Department of Mathematics, Los Angeles, Calif.; *Spectral Theory of Differential Operators;* 2 years; $10,500

J. G. van der Corput, Department of Mathematics; *Asymptotic Expansions;* 1 year; $19,200

Lowell J. Paige, Department of Mathematics, Los Angeles, Calif.; *Non-Associative Algebras;* 2 years; $6,200

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; Walter Noll, Department of Mathematics; *Theoretical Continuum Mechanics;* 3 years; $20,100

CATHOLIC UNIVERSITY OF AMERICA, Washington, D. C.; Eugene Lukacs, Department of Mathematics; *Characteristic Functions and Statistics;* 3 years; $26,400

UNIVERSITY OF CHICAGO, Chicago, Ill.

A. A. Albert, Department of Mathematics; *Linear Algebras;* 2 years; $13,600

Saunders MacLane, Department of Mathematics; *Topics in Topology, Geometry, Logic and Analysis;* 2 years; $29,100

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Paul Herget, Cincinnati Observatory; *Computing Research;* 1 year; $20,000

COLUMBIA UNIVERSITY, New York, N. Y.

Harish-Chandra, Department of Mathematics; *Spherical Functions on a Semisimple Lie Group;* 1 year; $5,000

E. R. Lorch, Department of Mathematics; *Integration in Functional Analysis;* 1 year; $6,500

UNIVERSITY OF CONNECTICUT, Storrs, Conn.; Elliot S. Wolk, Department of Mathematics; *Order Compatible Topologies;* 2 years; $4,000

CORNELL UNIVERSITY, Ithaca, N. Y.; W. H. J. Fuchs, Department of Mathematics; *Topics in Complex Variable;* 2 years; $25,000

DARTMOUTH COLLEGE, Hanover, N. H.; John G. Kemeny, Department of Mathematics; *Stochastic Processes;* 2 years; $19,000

UNIVERSITY OF DELAWARE, Newark, Del.; Robert F. Jackson, Department of Mathematics; *Computing Research;* 1 year; $10,000

UNIVERSITY OF GEORGIA, Athens, Ga.; M. L. Curtis, Department of Mathematics; *Subgroups of the Homotopy Groups;* 2 years; $14,500

HARVARD UNIVERSITY, Cambridge, Mass.; Howard Aiken, Computer Laboratory; *Computing Research;* 1 year; $25,000

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; M. A. McKiernan, Department of Mathematics; *Iteration and Functional Equations;* 1 year; $4,500

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Howard A. Osborn, Department of Mathematics; *Local Problems in Differentiable Manifolds;* 2 years; $13,600

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.

Louis Auslander, Department of Mathematics, Indiana University; *Discrete Groups of Affine Motions;* 2 years; $7,900

George Whaples, Department of Mathematics; *Algebraic Number Theory;* 2 years; $15,000

INSTITUTE FOR ADVANCED STUDY, Princeton, N. J.; Frank Harary, Department of Mathematics; *Theory of Graphs;* 10 months; $4,800

INSTITUTE OF MATHEMATICAL STATISTICS, Stanford, Calif.; I. R. Savage; *Summer Research Institute in Non-Parametric Inference;* 6 weeks; $15,000

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa.

John Gurland, Statistical Laboratory; *Distribution and Estimation Theory;* 3 years; $21,200

H. O. Hartley, Statistical Laboratory; *Estimation of Parameters from Incomplete Data;* 2 years; $9,000

Oscar Kempthorne, Statistical Laboratory; *A General Formulation of the Design of Experiments;* 3 years; $9,800

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; G. D. Mostow, Department of Mathematics; *Compact Transformation Groups;* 3 years; $23,200

UNIVERSITY OF KANSAS, Lawrence, Kans.

U. W. Hochstrasser, Computing Center; *Computing Research;* 1 year; $20,000

G. Baley Price, Department of Mathematics; *Geometry of Function Space;* 2 years; $40,300

Robert Schatten, Department of Mathematics; *The Trace-Class of Operators;* 1 year; $9,400

Robert Schatten, Department of Mathematics; *The Trace-Class of Operators;* 6 months; $3,000

KENYON COLLEGE, Gambier, Ohio; Otton Nikodym, Department of Mathematics; *Operators in Hilbert Space;* 2 years; $11,700

LEHIGH UNIVERSITY, Bethlehem, Pa.; Theodore Hailperin, Department of Mathematics; *Logical Principles Valid in All Finite Domains;* 3 years; $6,200

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; R. D. Anderson, Department of Mathematics; *Mappings of Higher Dimensional Spaces;* 3 years; $15,300

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Warren Ambrose, Department of Mathematics; *Topics in Topology and Differential Geometry;* 2 years; $33,300

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.

Leo Katz, Department of Mathematics; *Discrete Methods in Mathematical Statistics;* 2 years; $20,000

Lawrence W. Von Tersch and Gerald P. Weeg, Computer Laboratory; *Computing Research;* 1 year; $20,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

Arthur W. Burks, Department of Philosophy; *Logical Design of Computer Nets;* 2 years; $31,700

R. L. Wilder, Department of Mathematics; *Generalized Manifolds;* 6 months; $3,900

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.

Eugenio Calabi, Leon W. Green and Hidehiko, Department of Mathematics; *Topological and Differential Structure Manifolds;* 2 years; $14,800

Bjarni Jonsson, Department of Mathematics; *Lattice Theory;* 1 year; $3,000

UNIVERSITY OF NEW MEXICO, Albuquerque, New Mexico; I. I. Kolodner, Department of Mathematics and Astronomy; *Partially Ordered Spaces;* 2 years; $32,500

NEW YORK UNIVERSITY, New York, N. Y.; Richard Courant, Institute for Mathematical Sciences; *Research in Applied Mathematics;* 1 year; $50,000

NORTHWESTERN UNIVERSITY, Evanston, Ill.

Teruhisa Matsusaka, Department of Mathematics; *Problems in Algebraic Geometry;* 2 years; $4,100

Alex Rosenberg and Daniel Zelinsky, Department of Mathematics; *Homological Algebra;* 2 years; $9,000

Maxwell A. Rosenlicht, Department of Mathematics; *Algebraic Transformation Groups;* 1 year; $9,600

K. Aa. Strand, Computing Center; *Research Computing Center;* 1 year; $11,400

Hsien-Chung Wang, Department of Mathematics; *Totally Discontinuous Groups on Homogeneous Spaces;* 2 years; $4,300

PRINCETON UNIVERSITY, Princeton, N. J.

S. Lefschetz, Department of Mathematics; *Singularities of Differential Systems;* 2 years; $6,800

H. D. Smyth, Department of Engineering; *Computing Research;* 1 year; $30,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

Arthur H. Copeland, Jr.; Department of Mathematics; *Maps on Topological Pairs;* 2 years; $3,200

J. H. B. Kemperman, Department of Mathematics; *The Distribution of a Sequence;* 1 year; $8,900

REED COLLEGE, Portland, Oreg.; J. B. Roberts, Department of Mathematics; *Polynomial Identities;* 3 years; $7,800

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.

Herbert Busemann, Department of Mathematics; *Convex Surfaces and Finsler Spaces;* 2 years; $6,300

C. C. Chang, Department of Mathematics; *Research Program in the Foundations of Mathematics;* 2 years; $12,800

James Dugundji, Department of Mathematics; *Homology and Homotopy;* 2 years; $12,200

R. S. Phillips & H. A. Dye, Department of Mathematics; *Operator Theory;* 2 years; $29,800

STANFORD UNIVERSITY, Stanford, Calif.; Solomon Feferman, Department of Mathematics; *Generalized Product Theories;* 1 year; $2,400

SYRACUSE UNIVERSITY, Syracuse, N. Y.; Bruce Gilchrist, Computing Center; *Computing Research;* 1 year; $12,000

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; A. D. Wallace & A. H. Clifford, Department of Mathematics; *The Topology of Groups and Semi-Groups;* 2 years; $65,500

WASHINGTON UNIVERSITY, St. Louis, Mo.

Harvey Cohn, Department of Mathematics; *Computational Studies in Pure Mathematics;* 2 years; $17,200

Allen Devinatz, Department of Mathematics; *Spectral Problems in Harmonic Analysis;* 2 years; $7,600

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Edwin Hewitt, Department of Mathematics; *Functional Analysis;* 3 years; $75,000

WAYNE STATE UNIVERSITY, Detroit, Mich.; Felix Haas, Department of Mathematics; *Non-Linear Oscillations;* 2 years; $9,700

UNIVERSITY OF WISCONSIN, Madison, Wisc.; R. H. Bing, Department of Mathematics; *Topology in Three Dimensional Space;* 18 mos.; $12,100

YALE UNIVERSITY, New Haven, Conn.; Morris S. Davis, Computation Laboratory; *Computing Research;* 1 year; $20,000

METABOLIC BIOLOGY

AMERICAN UNIVERSITY OF BEIRUT, Beirut, Lebanon; John H. Schneider, Department of Biochemistry; *Synthesis of Deoxyribose*

Nucleic Acid in Normal and Regenerating Liver; 3 years; $10,000

BRANDEIS UNIVERSITY, Waltham, Mass.

Lawrence Grossman, Department of Biochemistry; *Nucleic Acid Metabolism of Host Cells Infected with Virus;* 3 years; $24,000

Nathan O. Kaplan, Department of Biochemistry; *Enzymatic and Immunochemical Factors Regulating Cellular Activity;* 3 years; $43,800

Morris Soodak, Department of Biochemistry and Biology; *Biosynthesis of L-Fucose and of Thyroglobulin;* 2 years; $15,300

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

I. L. Chaikoff, Department of Physiology, School of Medicine; *Basic Aspects of Mammalian Carbohydrate Metabolism;* 3 years; $45,000

Nicholas T. Mirov, Department of Geography; *Relation Between Boron and Carbohydrate Metabolism;* 2 years; $7,000

Irving Zabin, Department of Physiological Chemistry, Los Angeles; *Lipid Metabolism of the Brain;* 2 years; $17,000

UNIVERSITY OF CHICAGO, Chicago, Ill.

William B. Martin, Department of Microbiology; *Metabolism of Itaconic and Mesaconic Acids by Fungi;* 2 years; $6,700

Lloyd J. Roth, Department of Pharmacology; *Biogenesis and Metabolism of Tropane Alkaloids in Plants;* 2 years; $9,800

COLUMBIA UNIVERSITY, New York, N. Y.

Erwin Chargaff, Department of Biochemistry, College of Physicians and Surgeons; *Nucleic Acids Endowed With Biological Specificity;* 3 years; $45,000

Philip Feigelson, Department of Biochemistry, College of Physicians and Surgeons; *Induced Enzyme Formation in Mammals;* 2 years; $17,500

Seymour Lieberman, Department of Obstetrics and Gynecology; *Biogenesis of the Steroid Hormones;* 3 years; $36,000

CORNELL UNIVERSITY, Ithaca, N. Y.

Walter D. Bonner, Jr., Department of Botany; *Mechanics of Cellular Oxidations in Plant Tissues;* 3 years; $14,000

Walter D. Bonner, Jr. and Conrad S. Yocum, Department of Botany; *Double-beam Spectrophotometer for Research on Kinetics of Cellular Processes;* 1 year; $7,200

DARTMOUTH COLLEGE, Hanover, N. H.; Frank G. Carpenter, Department of Physiological Sciences, The Medical School; *Resting Metabolism of Immature Nerve Fibers;* 3 years; $4,300

UNIVERSITY OF DELAWARE, Newark, Del.; Bruce M. Pollock, Department of Biological Sciences; *Physiological and Biochemical Mechanisms of the Rest Period;* 18 months; $8,450

EMORY UNIVERSITY, Emory University, Ga.; Elliot Juni, Department of Bacteriology and Immunology; *Bacterial Oxidation of Simple Aliphatic Alcohols;* 3 years; $17,000

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Howard J. Teas, Department of Botany, Agricultural Experiment Station, *Biosynthesis of Lysine and Tryptophan;* 2 years; $14,000

UNIVERSITY OF GEORGIA, Athens, Ga.; Robert G. Eagon, Department of Bacteriology; *Synthesis of Polysaccharide by Pseudomonas Fluorescens;* 2 years; $6,000

GOUCHER COLLEGE, Baltimore, Md.; Helen B. Funk, Department of Physiology and Bacteriology; *The Role of Hemopoietic Vitamins in the Biosynthesis of Leghemoglobin;* 2 years; $8,200

HAHNEMANN MEDICAL COLLEGE, Philadelphia, Pa.; William L. Gaby, Division of Microbiology; *Role of Phospholipides in the Transport of Amino Acids;* 1 year; $7,100

HARVARD UNIVERSITY, Cambridge, Mass.

Boris Magasanik, Department of Immunology and Bacteriology; *Transfer of Single Carbon Units in Histidine and Purine Metabolism of Micro-Organisms;* 3 years; $19,500

Alwin M. Pappenheimer, Jr., Department of Biology; *The Mode of Action of Diphtheria Toxin;* 2 years; $43,000

W. R. Sistrom, Biological Laboratories; *Composition, Structure, and Function of Bacterial Chromatophores;* 3 years; $14,600

T. Hastings Wilson, Department of Physiology, The Medical School; *Mechanisms of Intestinal Absorption of Sugars and Nucleotides;* 2 years; $16,400

HOPE COLLEGE, Holland, Mich.; Philip G. Crook, Department of Biology; *Effect of Mammalian Hormones on Unicellular Organisms;* 2 years; $3,350

HOWARD UNIVERSITY, Washington, D. C.; Lawrence M. Marshall, Department of Biochemistry; *Role of the Tricarboxylic Acid Cycle in the Synthesis of Vitamin B–12;* 2 years; $10,000

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Allan H. Roush, Department of Biology; *Metabolism of Compounds Related to Lignin by Basidiomycetes;* 2 years; $7,500

UNIVERSITY OF ILLINOIS, Urbana, Ill.

I. C. Gunsalus, Division of Biochemistry; *Metabolic Biogenesis and Degradation of Terpenes by Microorganisms;* 4 years; $73,500

R. H. Hageman, Department of Agronomy; *Physiological Basis of Hybrid Vigor in Corn;* 2 years; $15,850

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.

Felix Haurowitz, Department of Chemistry, Indiana University; *Biosynthesis and Structure of Proteins and Antibodies;* 3 years; $21,000

W. J. Van Wagtendonk, Department of Zoology; *Nucleic Acid Turnover of Paramecium Aurelia;* 2 years; $13,000

KAISER FOUNDATION, Oakland, Calif.; Mary Belle Allen, Laboratory of Comparative Physiology and Morphology; *Comparative Biochemistry of Photosynthetic Pigments;* 2 years; $11,200

UNIVERSITY OF KANSAS, Lawrence, Kans.; H. J. Nicholas, Department of Gynecology and Obstetrics, Medical Center, Kansas, City, Kans.; *Metabolism of Cholesterol in the Central Nervous System;* 2 years; $13,700

UNIVERSITY OF MARYLAND, University Hospital, Baltimore, Md.; Samuel P. Bessman, Department of Pediatrics, Medical School, Baltimore, Md.; *A Feed Back System Relating Glucose Metabolism to Oxidations;* 2 years; $13,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.

Gene M. Brown, Department of Biology; *Metabolism and Function of B Vitamins;* 3 years; $23,650

John M. Buchanan, Division of Biochemistry, Department of Biology; *Biosynthesis of Amino Acids and Polypeptides;* 3 years; $60,000

Edward Herbert, Department of Biology; *Synthesis of Ribonucleic Acid by Cell-Free Systems;* 3 years; $30,000

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.

Robert P. Scheffer, Department of Botany and Plant Pathology; *Physiology of Parasitism;* 2 years; $11,000

Harold M. Sell, Department of Agricultural Chemistry; *The Biochemistry of Natural and Synthetic Growth Substances in Higher Plants;* 2 years; $16,100

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

I. A. Bernstein, Department of Dermatology, University Hospital; *Biosynthesis of Deoxyribose Nucleic Acid in Intact Cells;* 2 years; $14,700

G. Robert Greenberg, Department of Biological Chemistry; *Biosynthesis of Riboflavin;* 2 years; $14,700

James F. Hogg, Department of Biological Chemistry, Medical School; *Enzymatic Pathway of Glyconeogenesis;* 2 years; $14,000

MONTANA STATE COLLEGE, Bozeman, Mont.; John E. Gander, Department of Chemistry; *Mechanism of Glucosidic Cyanide Formation in Plants;* 2 years; $7,000

UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; J. H. Pazur, Department of Biochemistry and Nutrition; *Enzymatic Synthesis of Galactosyl Oligosaccharides;* 2 years; $12,500

UNIVERSITY OF OREGON, Eugene, Oreg.; Bradley T. Scheer, Department of Biology; *Humoral Control of Metabolism in Crustaceans;* 2 years; $23,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.

Carl O. Clagett, Department of Agricultural and Biological Chemistry; *Role of Peptides in Plant Metabolism;* 2 years; $6,100

Eugene S. Lindstrom, Department of Bacteriology; *Light Induced Phosphorylation in Photosynthetic Bacteria;* 1 year; $6,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

Harry Beevers, Department of Biological Sciences; *The Glyoxylate Cycle in Plant Metabolism;* 3 years; $30,200

Henry Koffler, Department of Biological Sciences; *Biosynthesis and Function of Certain Fungal Carbohydrates;* 3 years; $20,700

REED COLLEGE, Portland, Oreg.; Helen A. Stafford, Department of Biology; *Dihydroxyfumarate and Its Derivatives in the Carbohydrate Metabolism of Higher Plants;* 3 years; $10,000

THE ROCKEFELLER INSTITUTE, New York, N. Y.; Fritz Lipmann; *Metabolic Group Activation;* 4 years; $120,000

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Henry J. Vogel, Institute of Microbiology; *Comparative Microbial Biosynthesis of Amino Acids;* 3 years; $25,400

SCRIPPS CLINIC AND RESEARCH FOUNDATION, La Jolla, Calif.; Grant R. Bartlett, Division of Laboratories; *Metabolism of the Mammalian Erythrocyte;* 2 years; $13,000

SETON HALL COLLEGE OF MEDICINE AND DENTISTRY, Medical Center, Jersey City, N. J.; R. L. Garner, Department of Biochemistry; *Adaptive Fermentation of the Methyl Pentoses;* 2 years; $12,000

SMITH COLLEGE, Northampton, Mass.; Stanley M. Bloom, Department of Chemistry; *Role of Mevalonic Acid in Metabolism of Penicillium Griseo-Fulvum;* 2 years; $8,700

SMITHSONIAN INSTITUTION, Washington, D. C.; Herbert Friedmann, United States National Museum; *Metabolic Aspects of the Digestion of Wax;* 1 year; $7,700

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.

Walter Marx, Department of Biochemistry & Nutrition; *Thyroxine and Yeast Metabolism;* 1 year; $6,000

Sydney C. Rittenberg, Department of Bacteriology; *Oxidation of Propionate by Pseudomonas Fluorescens;* 2 years; $17,800

TEMPLE UNIVERSITY, Philadelphia, Pa.; John M. Ward, Department of Biology; *Biochemical Aspects of Morphogenesis;* 2 years; $17,400

UNIVERSITY OF TEXAS, Austin, Tex.

Jack Myers, Department of Zoology; *Physiology and Biochemistry of Algae;* 3 years; $19,000

Lothar L. Salomon, Department of Biochemistry and Nutrition, Medical Branch, Galveston, Tex.; *The Nature, Role and Metabolism of Adrenal Ascorbic Acid;* 2 years; $8,600

UNIVERSITY OF UTAH, Salt Lake City, Utah; Richard W. Van Norman, Department of Experimental Biology; *Relative Participation of Chloroplast Pigments in Photosynthesis;* 2 years; $13,600

VANDERBILT UNIVERSITY, Nashville, Tenn.; Charles R. Park, Department of Physiology; *Glucose Transport in Mammalian Cells;* 3 years; $32,000

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; M. Daniel Lane, Department of Biochemistry and Nutrition; *The Enzymatic Carboxylation of Propionyl Coenzyme A;* 3 years; $17,200

WALDEMAR MEDICAL RESEARCH FOUNDATION, INC., Port Washington, Long Island, N. Y.; William H. Pearlman, Associate Scientific Director; *The Metabolism of Certain Steroid Hormones;* 3 years; $40,000

WASHINGTON UNIVERSITY, St. Louis, Mo.

Theodore Cayle, Henry Shaw School of Botany; *Distribution of C^{14} in the Early Products of Photosynthesis;* 2 years; $11,000

Oliver H. Lowry, Department of Pharmacology, School of Medicine; *Riboflavin Enzymes;* 3 years; $48,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Bastiaan J. D. Meeuse, Department of Botany; *Oxalic Acid Metabolism in Plants;* 1 year; $6,950

UNIVERSITY OF WISCONSIN, Madison, Wis.

Harlyn O. Halvorson, Department of Bacteriology; *Protein Biosynthesis in Yeast;* 1 year; $10,000

Glenn S. Pound, Department of Plant Pathology; *Physiology of Virus Multiplication in Plants;* 2 years; $9,000

WORCESTER FOUNDATION, Shrewsbury, Mass.; Ralph I. Dorfman, Director of Laboratories; *Mechanism of Hormone Action;* 2 years; $18,300

YALE UNIVERSITY, New Haven, Conn.

Morris Foster, Section of Dermatology, Yale University School of Medicine; *Physiological Studies of Melanogenesis;* 2 years; $11,300

Arthur W. Galston, Department of Botany; *The Relation of Light and Photomimetic Substances to Growth and Flowering in Plants;* 3 years; $29,000

Arthur W. Galston, Department of Botany; *Light-Controlled Growth Reactions in Plants;* 2 years; $16,500

C. N. H. Long, Department of Physiology; *Hormone Regulation of Protein and Carbohydrate Metabolism;* 3 years; $57,600

YESHIVA UNIVERSITY, New York, N. Y.

San Seifter, Department of Biochemistry, Albert Einstein College of Medicine; *Formation of Hydroproline and Hydroxylysine;* 2 years; $15,300

Harold J. Strecker, Department of Biochemistry, Albert Einstein College of Medicine; *Interconversion of Glutamic Acid and Proline;* 2 years; $18,000

Abraham White, Department of Biochemistry, Albert Einstein College of Medicine; *Effects of Adrenal Cortical Steroids on Metabolism of Lymphoid Tissue;* 3 years; $34,000

MOLECULAR BIOLOGY

Dr. HUGO BAUER, NATIONAL INSTITUTES OF HEALTH, Bethesda, Md.; *Products of Histidine Metabolism;* 1 year; $4,000

BARNARD COLLEGE, New York, N. Y.; William A. Corpe, Department of Botany; *Capsular Material of* Chromobacterium SPP; 1 year; $1,000

BOSTON UNIVERSITY, Boston, Mass.; William C. Boyd, Department of Biochemistry, School of Medicine; *Antibody-Antigen Reactions;* 3 years; $25,000

BRANDEIS UNIVERSITY, Waltham, Mass.

William P. Jencks, Department of Biochemistry; *Energy Transferring Reactions in Biological Systems;* 3 years; $23,500

Mary Ellen Jones, Graduate Department of Biochemistry; *Biosynthetic and Transfer Reactions Involving Nitrogen Compounds;* 3 years; $22,000

Martin D. Kamen, Department of Biochemistry; *Photoactivation and Electron Transfer Processes in Photosynthetic Bacteria;* 1 year; $18,600

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; H. K. Mitchell, Division of Biology; *Amino Acid-Containing Lipids;* 3 years; $36,000

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Allen G. Marr, Department of Bacteriology, Davis, Calif.; *Biochemical Cytology of the Azotobacter;* 2 years; $12,000

P. K. Stumpf, Department of Plant Biochemistry; *Enzymatic Mechanisms Participating in Fat Metabolism of Higher Plants;* 3 years; $34,400

UNIVERSITY OF CHICAGO, Chicago, Ill.

Kenneth D. Kopple, Department of Chemistry; *Peptide Models of Enzymes;* 3 years; $25,500

H. B. Steinbach, Department of Zoology; *Ion Binding and Enzyme Activation in Muscle;* 2 years; $13,500

Birgit Vennesland, Department of Biochemistry; *Enzyme Reactions of Chloroplasts;* 3 years; $35,000

John Westley, Department of Biochemistry; *Biochemical Environment and Protein Structure;* 2 years; $14,000

CITY OF HOPE MEDICAL CENTER, Duarte, Calif.; Richard S. Schweet, Division of Research; *Soluble Enzymes Related to Protein Synthesis;* 2 years; $11,600

COLUMBIA UNIVERSITY, New York, N. Y.

S. M. Beiser and F. Agate, College of Physicians and Surgeons; *Biological Properties of Steroid Hormone-Protein Conjugates;* 2 years; $17,000

E. A. Kabat, Department of Microbiology, College of Physicians and Surgeons; *Spectrophotometry in Biochemical Research;* 1 year; $8,000

Elvin A. Kabat, College of Physicians and Surgeons; *Immunochemical Studies on Polysaccharides;* 3 years; $88,000

Stanley L. Miller, Department of Biochemistry, College of Physicians and Surgeons; *Synthesis of Organic Compounds on the Primitive Earth;* 2 years; $16,000

David Nachmansohn, Department of Neurology; *Molecular Forces in Nerve Impulse Conduction;* 3 years; $45,000

William L. Nastuk, Department of Physiology, College of Physicians and Surgeons; *Ionic Permeability Change Produced at the End-Plate Membrane;* 1 year; $9,000

David Shemin, Department of Biochemistry; *Biosynthesis and Function of Porphyrins;* 3 years; $46,000

Stephen Zamenhof, Department of Biochemistry; *Introduction of Unnatural Bases Into Deoxypentose Nucleic Acids and the Genetical Effects of Such Introduction;* 3 years; $32,000

CORNELL UNIVERSITY, Ithaca, N. Y.

George P. Hess, Department of Biochemistry and Nutrition; *Structural and Functional Interrelationships in Enzymes;* 2 years; $16,000

Robert W. Holley, Department of Biochemistry and Nutrition; *Biosynthesis of Proteins;* 3 years; $27,000

DARTMOUTH COLLEGE, Hanover, N. H.; Arthur Samuels and Manuel Morales, Department of Biochemistry; *Immunochemical Reagents and Their Application to Muscle Studies;* 2 years; $25,000

DUQUESNE UNIVERSITY, Pittsburgh, Pa.; Oscar Gawron, Department of Chemistry; *Reaction of Cyanide With Cystine;* 2 years; $6,000

EARLHAM COLLEGE, Richmond, Ind.; William K. Stephenson, Department of Biology; *Ion Distribution and Electrical Membrane Properties in Muscle Fibers;* 2 years; $10,000

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Sidney W. Fox, The Oceanographic Institute; *Biogenesis: Thermal Prebiochemical Reactions;* 2 years; $10,000

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; Erich Heinz, Department of Physiology, School of Medicine; *Basis of Active Transport Across a Living Membrane;* 1 year; $4,700

HAHNEMANN MEDICAL COLLEGE AND HOSPITAL, Philadelphia Pa.

M. John Boyd, Department of Biological Chemistry; *Spectrophotometry in Biochemical Research;* 1 year; $8,000

Jay S. Roth, Division of Biological Chemistry; *Isolation, Characterization and Biological Function of an Inactive Ribonuclease;* 2 years; $15,000

HARVARD UNIVERSITY, Cambridge, Mass.

James D. Watson, Department of Biology; *Structure and Function of Bacterial Microsomes;* 2 years; $46,000

Morton M. Weber, Department of Bacteriology; *Electron Transport in Anaerobic Microorganisms;* 2 years; $12,000

F. H. Westheimer, Department of Chemistry; *Chemical Models for Enzyme Systems;* 4 years; $42,000

HOWARD UNIVERSITY, Washington, D. C.; Felix Friedberg, Department of Biochemistry; *Peptides in Creatine Transphosphorylase;* 2 years; $12,500

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Robert Emerson, Department of Botany; *Quantum Yield of Photosynthesis;* 3 years; $32,000

John W. Hastings, Department of Chemistry; *Luminescence in the Marine Dinoflagellates;* 2 years; $16,700

Eugene Rabinowitch, Department of Botany; *Photochemical and Photogalvanic Storage of Light Energy in Heterogeneous Systems;* 3 years; $26,000

S. Spiegelman, Department of Bacteriology; *Synthesis of Ribonucleic Acid and Deoxyribonucleic Acid in Subcellular Systems;* 3 years; $30,000

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Henry B. Bull, Department of Biochemistry, College of Medicine; *Electrophoresis of Adsorbed and of Dissolved Proteins;* 3 years; $45,000

MARYCREST COLLEGE, Davenport, Iowa; Sister Helene Ven Horst, Department of Chemistry; *Effect of Radiations on Amino Acids;* 1 year; $1,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Rufus Lumry, School of Chemistry; *Reaction Kinetics of Hydrolytic Enzymes;* 2 years; $12,500

UNIVERSITY OF MISSOURI, Columbia, Mo.

Warren R. Fleming, Department of Zoology; *Permeability Properties and the Potential Across the Isolated Frog Skin;* 2 years; $14,000

Owen J. Koeppe, Department of Biochemistry, School of Medicine; *Mechanism of Action of Glyceraldehyde-3-Phosphate Dehydrogenases;* 2 years; $11,000

MOUNT SINAI HOSPITAL, New York, N. Y.; Harry Sobotka and Ross F. Nigrelli, Department of Chemistry; *Digitalis-like Products From Marine Animals;* 2 years; $12,000

NEW YORK UNIVERSITY, New York, N. Y.

Robert Warner Chambers, Department of Biochemistry, College of Medicine, *Synthesis of Nucleotides;* 3 years; $21,000

Paul R. Cross, Department of Biology; *Purchase of a Spinco Ultracentrifuge;* 2 years; $6,000

OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, Stillwater, Okla.; L. M. Henderson, Department of Agricultural Chemistry; *Biological Oxidation of 3-Hydroxyanthranilate;* 3 years; $31,000

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.

David L. Drabkin, Department of Biochemistry, Graduate School of Medicine; *Differentiation of Hemoglobins;* 2 years; $20,000

Elizabeth Trorogood, Botany Department; *Legume Nodule Heme Proteins;* 2 years; $17,000

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.

Gary Felsenfeld, Department of Biophysics; *The Active Site in Some Copper-Carrying Proteins;* 3 years; $23,000

Peter S. Olmsted, Department of Biochemistry; *Mechanism of in Vitro Polynucleotide Synthesis;* 3 years; $30,000

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N. Y.; Murray Goodmen, Department of Chemistry; *Synthesis and Reactions of Peptides and Their Derivatives;* 2 years; $16,000

PRINCETON UNIVERSITY, Princeton, N. J.

Aurin M. Chase, Department of Biology; *Mechanism of Enzyme Action: Luciferase;* 3 years; $10,000

E. Newton Harvey, Department of Biology, *Isolation and Chemical Composition of Cypridina Luciferin;* 1 year; $6,900

Frank H. Johnson, Department of Biology; *Biochemistry of Luminescent Systems;* 3 years; $30,000

UNIVERSITY OF PUERTO RICO, San Juan, Puerto Rico; David B. Tyler, Department of Pharmacology; *Kinetics and Biological Significance of Metal Complexes of Oxaloacetic Acid;* 2 years; $11,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Bernard Axelrod, Department of Biochemistry, Purdue University; *Protein Synthesis at the Sub-Cellular Level;* 3 years; $28,000

REED COLLEGE, Portland, Oreg.; A. H. Livermore, Department of Chemistry; *Cysteine and Homocysteine Desulfhydrases;* 2 years; $13,000

THE ROCKEFELLER INSTITUTE, New York, N. Y.; Edward J. Murphy; *Electrical Conduction in Hydrogen-Bonded Substances;* 2 years; $32,000

ST. LOUIS UNIVERSITY, St. Louis, Mo.; Elijah Adams, Department of Pharmacology, School of Medicine; *Amino Acid Metabolism in Bacteria;* 2 years; $53,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Richard W. Eppley, Department of Biology; *Active Transport in Porphyra Perforata;* 2 years; $11,500

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; Leonard B. Kirschner, Department of Zoology; *Movement of Water in Biological Systems;* 2 years; $10,000

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; John L. Wood, Division of Chemistry, School of Medicine, Memphis, Tenn.; *Purchase of an Infrared Spectrophotometer for Biochemical Research;* 1 year; $14,000

VILLANOVA UNIVERSITY, Villanova, Pa.; Thomas H. Doyne, Research and Development Division; *Crystal Structure of Amino Acid and Dipeptide Metallic Salts;* 2 years; $15,500

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Donald W. Kupke, Department of Biochemistry, School of Medicine; *Protein Component Involved in the Photochemical Transformation of Protochlorophyll to Chlorophyll-A;* 3 years; $23,000

WASHINGTON UNIVERSITY, St. Louis, Missouri; Philipp Strittmatter, Department of Biological Chemistry, School of Medicine; *Characterization of Mammalian Cytochromes;* 3 years; $20,000

UNIVERSITY OF WASHINGTON, Seattle Wash., Robert F. Labbe, Department of Pediatrics, School of Medicine; *The Mechanism by Which Iron Is Incorporated Into Heme;* 1 year; $7,800

UNIVERSITY OF WISCONSIN, Madison, Wis.

Robert A. Alberty, Department of Chemistry; *Physical Chemical Studies of Fumarase;* 4 years; $60,000

Stephen A. Kuby, Institute of Enzyme Research; *ATP-Transphosphorylase Catalyzed Reactions;* 3 years; $22,000

Edward E. Smissman, School of Pharmacy; *Synthesis and Study of Biosynthetic Intermediates;* 3 years; $19,000

YALE UNIVERSITY, New Haven, Conn.

Henry A. Harbury, Department of Biochemistry; *Protein-Prosthetic Group Interaction;* 2 years; $17,000

G. Evelyn Hutchinson, Osborn Zoological Laboratory; *Diagenetic Changes in Pigments in Lacustrine Sediments;* 1 year; $5,800

Frederic M. Richards, Department of Biochemistry; *Chemistry of the Functional Groups of Ribonuclease;* 2 years; $12,000

YESHIVA UNIVERSITY, New York, N. Y.

Henry D. Hoberman, Department of Biochemistry, Albert Einstein College of Medicine; *Coenzyme-Linked Oxidation-Reduction Reactions;* 3 years; $30,000

Alex B. Novikoff, Albert Einstein College of Medicine; *Biochemical and Structural Correlations of Microsomes;* 2 years; $13,500

PSYCHOBIOLOGY

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.

Helmut E. Adler, Department of Animal Behavior; *Sensory Factors in Bird Navigation;* 1 years; $14,400

Evelyn Shaw, Department of Animal Behavior; *Development of Schooling Behavior;* 1 year; $9,700

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Joe T. Marshall, Jr.; Department of Zoology; *Research on Speciation;* 1 year; $4,200

BRANDEIS UNIVERSITY, Waltham, Mass.; Richard Held, Department of Psychology; *Visual-Motor Coordination;* 2 years; $21,200

BROWN UNIVERSITY, Providence, R. I.; Frances L. Clayton, Department of Psychology; *Analysis of Secondary Reward;* 2 years; $8,500

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

W. E. Jeffrey, Department of Psychology, Los Angeles: *Research on Discrimination Learning;* 2 years; $19,800

John P. Seward, Department of Psychology, Los Angeles; *Drive-Incentive Interaction;* 1 year; $5,200

CENTRAL INSTITUTE FOR THE DEAF, St. Louis, Mo.; Ira J. Hirsh, Psychology Laboratory; *Studies in Temporal Perception;* 3 years; $56,200

UNIVERSITY OF CHICAGO, Chicago, Ill.

Robert A Butler, Department of Psychology; *Effects of Brain Damage on Responsiveness to Visual and Auditory Incentives;* 2 years; $25,500

I. T. Diamond, Department of Psychology; *Behavioral Analysis of the Somatic Cortex;* 2 years; $21,600

CLEVELAND HEARING AND SPEECH CENTER, Cleveland, Ohio; Earl D. Schubert, Acting Director; *Interaural Temporal Disparity;* 1 year; $5,700

COLLEGE OF WILLIAM AND MARY, Williamsburg, Va.; John K. Bare, Department of Psychology; *Physiological Bases of Motivation;* 2 years; $4,600

COLUMBIA UNIVERSITY, New York, N. Y.; William N. Schoenfeld and William W. Cumming, Department of Psychology; *Research on Schedules of Reinforcement;* 1 year; $2,800

COLUMBUS STATE INSTITUTE OF PSYCHIATRY, Columbus, Ohio; Seymour Levine, Research Division; *Studies in Drive Discrimination;* 2 years; $10,600

CORNELL UNIVERSITY, Ithaca, N. Y.

William C. Dilger, Laboratory of Ornithology; *Ethological Studies of Agapornic;* 2 years; $15,600

Eleanor J. Gibson & Richard D. Walk, Department of Psychology; *Study of Visual Depth Discrimination;* 2 years; $12,900

J. E. Hochberg, Department of Psychology; *Dimensions of Form Perception;* 2 years; $5,800

DARTMOUTH COLLEGE, Hanover, N. H.; Wolfgang Kohler, Department of Psychology; *Problems in Gestalt Psychology;* 3 years; $32,000

DUKE UNIVERSITY, Durham, N. C.; Kellogg V. Wilson, Department of Psychology; *Multidimensional Stimulus Scaling;* 1 year; $4,900

EMORY UNIVERSITY, Emory University, Ga.; Henry W. Nissen, Director, Yerkes Laboratories of Primate Biology; *The Basic Research Program of the Yerkes Laboratories of Primate Biology;* 1 year; $40,000

FRANKLIN AND MARSHALL COLLEGE, Lancaster, Pa.; Kenneth R. John, Department of Biology; *Study of Schooling Behavior;* 1 year; $3,600

UNIVERSITY OF GEORGIA, Athens, Ga.; Gernard S. Martof, Department of Zoology; *Behavior of Amphibians;* 2 years; $9,300

HARVARD UNIVERSITY, Cambridge, Mass.; Philip Teitelbaum, Department of Psychology; *Effect of Hypothalamic Lesions on Behavior;* 2 years; $17,500

UNIVERSITY OF HAWAII, Honolulu, T. H.; A. Leonard Diamond, Department of Psychology; *Simultaneous Brightness Contrast;* 2 years; $11,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Donelson E. Dulany, Jr., Department of Psychology; *Reinforcement of Verbal Behavior;* 1 year; $6,300

G. Robert Grice, Department of Psychology; *Studies in Human Conditioning;* 3 years; $17,200

Harold W. Hake, Department of Psychology; *Role of Recognition in Perception;* 3 years; $15,700

Lawrence I. O'Kelly, Department of Psychology; *Influence of Physiological Variables on Behavior;* 3 years; $20,000

Garth J. Thomas, Department of Electrical Engineering; *Behavioral Alterations Following Lesions in the Rhinencephalon;* 2 years; $34,000

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; W. K. Estes and C. J. Burke, Department of Psychology, Indiana University; *Analysis of Learning;* 5 years; $68,400

INSTITUTE OF LIVING, Hartford, Conn.; John S. Stamm; *Effects of Cortical Stimulation on Learning and Retention;* 2 years; $16,600

KENT STATE UNIVERSITY, Kent, Ohio; Charles C. Perkins, Jr., Department of Psychology; *Study of Stimulus Generalization;* 1 year; $7,500

LOUISANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Donald J. Lewis, Department of Psychology; *Persistence of Unrewarded Responses in Human Adults;* 3 years; $21,300

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Walter A. Rosenblith, Department of Electrical Engineering; *Research on Speech Perception;* 2 years; $50,400

MCGILL UNIVERSITY, Montreal, Canada; Herbert H. Jasper, Montreal Neurological Institute; *Neurophysiological Research;* 2 years; $21,400

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

Mathew Alpern, Department of Ophthalmology; *Studies of Contrast Phenomena;* 2 years; $15,200

John E. Bardach, Department of Fisheries; *Behavior of Reef Fishes;* 6 months; $600

Donald G. Marquis and W. Crawford Clark, Department of Psychology; *Temporal Characteristics of the Visual System;* 1 year; $5,200

Robert W. Storer, Department of Zoology; *Comparative Behavior of Grebes;* 4 years; $14,100

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Kenneth MacCorquodale and Paul E. Meehl, Department of Psychology; *Studies of Reinforcement;* 1 year; $6,900

MONTANA STATE UNIVERSITY, Missoula, Mont.; Clyde E. Noble, Department of Psychology; *Analysis of Trial-and-Error Learning;* 2 years; $15,400

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; Glen Finch, Executive Secretary, Division of Anthropology and Psychology; *International Directory of Psychologists;* 1 year; $2,000

NEW YORK UNIVERSITY, New York, N. Y.; Leo M. Hurvich, Department of Psychology; *Investigation of the Visual Response Processes;* 3 years; $32,000

OHIO STATE UNIVERSITY, Columbus 10, Ohio; Donald R. Meyer, Department of Psychology; *Studies in Primate Learning;* 1 year; $17,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; John F. Corso, Department of Psychology; *Neural Quantum Theory of Hearing;* 1 year; $9,300

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Eliot Stellar, Institute of Neurological Sciences; *Physiological Mechanisms of Motivation;* 3 years; $23,500

PRINCETON UNIVERSITY, Princeton, N. J.

Robert C. Bolles, Department of Psychology; *Stimulus Properties of Drives;* 1 year; $3,600

Byron A. Compbell, Department of Psychology; *Methodological Study of the Aversive Properties of Stimuli;* 2 years; $15,000

QUEENS COLLEGE, Flushing, N. Y.; Eugene S. Gollin, Department of Psychology; *Development of Visual and Tactual Recognition;* 1 year; $9,500

SMITHSONIAN INSTITUTION, Washington, D. C.

Martin Moynihan, Canal Zone Biological Area; *Behavior of Neotropical Lepidoptera;* 1 year; $4,800

Martin Moynihan, Canal Zone Biological Area; *Comparative Analysis of Behavior in Tropical Birds;* 3 years; $22,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; W. W. Grings, Department of Psychology; *Stimulus Patterning in Learning;* 1 year; $5,000

UNIVERSITY OF TEXAS, Austin, Tex.; Robert K. Young, Department of Psychology; *Studies of Verbal Learning;* 2 years; $5,000

TULANE UNIVERSITY, New Orleans, La.

Abram Amsel, Department of Psychology, Newcomb College; *Factors in Reward Situations;* 2 years; $12,600

Edward A. Bilodeau, Department of Psychology; *Studies of Learning and Retention;* 3 years; $14,900

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Frank W. Finger and L. Starling Reid, Department of Psychology; *Research on Induced Drive States;* 3 years; $16,800

UNIVERSITY OF WISCONSIN, Madison, Wisc.; W. J. Brogden, Department of Psychology; *Learning and Conditioning;* 3 years; $30,700

YALE UNIVERSITY, New Haven, Conn.

William N. Dember, Department of Psychology; *Study of Perception and Learning;* 1 year; $5,600

Frank A. Logan, Department of Psychology; *Conditions of Reinforcement;* 1 year; $6,000

Fred D. Sheffield, Department of Psychology; *Studies in Conditioning;* 2 years; $9,100

YESHIVA UNIVERSITY, New York, N. Y.; Seth K. Sharpless, Department of Pharmacology; *Biochemical Correlates of Behavior;* 2 years; $23,900

PHYSICS

BOSTON UNIVERSITY, Boston, Mass.; Robert K. Nesbet, Department of Physics; *Semi-Empirical Calculation of Molecular-Electronic Wave Functions;* 2 years; $11,800

BRANDEIS UNIVERSITY, Waltham, Mass.

Max Chretien, Department of Physics; *Elementary Particle Studies With Bubble Chambers;* 2 years; $15,400

Silvan S. Schweber, Department of Physics; *Quantum Theory of Fields;* 2 years; $10,300

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; John H. Gardner, Department of Physics;

Gyromagnetic Ratio of the Free Electron; 2 years; $22,000

BROWN UNIVERSITY, Providence, R. I.

Philip J. Bray, Department of Physics; *Nuclear Resonance Studies of Electron Distributions and Crystal Structure;* 2 years; $16,200

David Feldman, Department of Physics; *Theoretical High-Energy Physics;* 2 years; $26,800

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Harry A. Kirkpatrick, Department of Physics; *Precision Measurements of Certain Fundamental Natural Constants;* 2 years; $26,400

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Robert Karplus and Malvin A. Ruderman, Department of Physics; *Elementary Particles and High Energy Interactions;* 2 years; $30,900

W. A. Nierenberg and G. O. Brink, Department of Physics; *Hyperfine Structure Anomalies of Isotopes;* 2 years; $18,200

M. Tinkham, Department of Physics; *Studies of Solids at Millimeter and Sub-Millimeter Wavelengths;* 2 years; $23,500

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.

Robert T. Schumacher, Department of Physics; *Magnetic Resonance Studies;* 2 years; $18,000

S. A. Friedberg, Department of Physics; *Investigation of Solids at Low Temperatures;* 2 years; $13,400

UNIVERSITY OF CHICAGO, Chicago, Ill.

A. W. Lawson and M. H. Cohen, Department of Physics; *Solid State Properties of Bismuth, Antimony, and Arsenic;* 2 years; $30,800

Marcel Schein, Department of Physics; *Interaction of Hyperons and Heavy Mesons;* 2 years; $23,000

Marcel Schein, Department of Physics; *Cooperative Emulsion Flight for High Energy Events;* 3 years; $450,000

CLARKSON COLLEGE OF TECHNOLOGY, Potsdam, N. Y.; John Weymouth, Department of Physics; *Thermal Diffuse X-Ray Scattering of Solids;* 2 years; $11,800

COLUMBIA UNIVERSITY, New York, N. Y.

Henry A. Boorse, Department of Physics; *Researches in Low Temperature Physics;* 3 years; $73,300

Gerard G. Harris and Jay Orear, Department of Physics; *Properties and Interactions of Elementary Particles;* 2 years; $21,600

CORNELL UNIVERSITY, Ithaca, N. Y.; Robert M. Cotts, Department of Physics; *A Nuclear Spin Resonance Study of Solids;* 3 years; $45,100

DARTMOUTH COLLEGE, Hanover, N. H.; J. W. Dewdney, Department of Physics; *Energy Distribution of Photoelectrons;* 2 years; $12,500

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; H. S. Plendl, Department of Physics; *Nuclear Spectroscopy;* 3 years; $19,600

FRANKLIN INSTITUTE, Philadelphia, Pa.; F. R. Metzger, Bartol Research Foundation, Swarthmore, Pa.; *Nuclear Resonance Fluorescence Studies Using a Centrifuge Method;* 2 years; $43,600

GEORGETOWN UNIVERSITY, Washington, D. C.; Robert N. Schwartz, Department of Physics; *Shock Wave Study of Vibrational Excitations in Gases;* 2 years; $19,100

HARVARD UNIVERSITY, Cambridge, Mass.

Francis M. Pipkin, Department of Physics; *Radio-Frequency Alignment of Nuclear Spins;* 2 years; $25,700

Norman F. Ramsey, Department of Physics; *Molecular Beam Studies;* 2 years; $56,600

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Hans Meissner, Department of Physics; *Studies on Superconductivity;* 2 years; $17,500

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Frederick Seitz, Department of Physics; *Imperfections in Crystalline Materials;* 2 years; $15,600

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; J. M. Jauch, Department of Physics; *A Study of the Scattering Matrix;* 2 years; $16,500

MARQUETTE UNIVERSITY, Milwaukee, Wis.; A. G. Barkow, Department of Physics; *Elementary Particle Reactions;* 2 years; $8,600

UNIVERSITY OF MARYLAND, College Park, Md.

Laurens Jansen, Institute of Molecular Physics; *Physical Properties of Condensed Non-Polar Gases;* 2 years; $160,000

Joseph Weber, Department of Physics; *Research on Relativity Theory;* 2 years; $8,700

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Bruno Rossi, Department of Physics; *Cosmic Ray Air Shower Research;* 2 years; $134,300

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.

Joseph Ballam, Department of Physics; *Properties of Heavy Mesons and Hyperons;* 2 years; $28,800

Sherwood K. Haynes, Department of Physics; *Beta-Ray Spectroscopy at Very Low Energies;* 2 years; $17,600

MIDWESTERN UNIVERSITIES RESEARCH ASSOCIATION, Madison, Wis.; Keith R. Symon, The University of Wisconsin; *High Energy Acelerator Studies;* 1 year; $160,000

MONTANA STATE COLLEGE, Bozeman, Mont.; Hack Arroe, Department of Physics; *Hyperfine Structure in Atomic Spectra;* 2 years; $19,400

NEW MEXICO COLLEGE, State College, N. Mex.; Robert E. McDaniel, Department of Physics; *Heavy Nuclei Component of Cosmic Radiation;* 2 years, $4,800

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; John R. Green, Department of Physics; *Penetrating Showers Produced in Light Elements;* 1 year; $9,800

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.

Bryce S. DeWitt, Department of Physics; *Gravitational Field Theory;* 2 years; $13,400

R. E. Glover, Department of Physics; *Superconductivity in Thin Films;* 2 years; $38,200

OHIO STATE UNIVERSITY, Columbus, Ohio

John G. Daunt, Department of Physics; *Physical Phenomena at Very Low Temperatures;* 5 years; $208,000

R. L. Mills and A. M. Sessler, Department of Physics; *Theoretical Problems in Nuclear Physics;* 2 years; $28,000

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.

R. G. Fowler and O. H. Theimer, Department of Physics, University of Oklahoma; *Influence of the Debye Shielding Effect of Strong Plasmas;* 2 years; $13,000

Chun C. Lin, Department of Physics; *Pressure Broadening of Microwave Spectral Lines;* 2 years; $6,500

J. R. Nielsen and O. H. Theimer, Department of Physics, University of Oklahoma; *Vibrational Spectra of Crystals and Polymers;* 2 years; $18,600

UNIVERSITY OF OREGON, Eugene, Oreg.; Bernd Crasemann, Department of Physics; *Electron Capture Branching Ratios and Fluorescence Yields;* 3 years; $16,100

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Edwin R. Fitzgerald, Department of Physics; *Dynamic Properties of Metals;* 3 years; $23,300

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.

C. Dean and G. A. Jeffrey, Department of Physics; *Study of Crystal and Molecular Structure;* 2 years; $10,300

T. M. Donahue, Department of Physics; *Oxygen and Sodium in the Upper Atmosphere;* 1 year; $8,100

COLLEGE OF PUGET SOUND, Tacoma, Wash.; Martin E. Nelson, Department of Physics; *Primary Cosmic Ray Studies Using Nuclear Emulsions;* 2 years; $7,100

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Kenneth L. Andrew, Department of Physics, Purdue University; *The Spectra of the Carbon Group and Their Analyses;* 2 years; $10,200

REED COLLEGE, Portland, Oreg.; R. L. Martin, Department of Physics; *Optical Properties of Silver Halides;* 2 years; $10,100

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; M. Parker Givens, Institute of Optics; *A Study of the Optical Constants of Metals;* 2 years; $18,700

SEATTLE PACIFIC COLLEGE, Seattle Wash.; Donald D. Kerlee, Department of Physics; *Primary Cosmic Ray Studies Using Nuclear Emulsions;* 2 years; $12,000

SEATTLE UNIVERSITY, Seattle, Wash.; Paul S. L. Luger, S. J., Department of Physics; *Radionuclide Half-Life Measurement With a Precision Recording Electrometer;* 2 years; $3,200

SYRACUSE UNIVERSITY, Syracuse, N. Y.; Peter G. Bergmann, Department of Physics; *Radiation Theory in General Relativity and Electrodynamics;* 2 years; $22,000

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; D. T. King, Department of Physics; *Multiple Meson Production in Energetic Collisions of Nucleons;* 2 years; $27,000

TRINITY COLLEGE, Hartford, Conn.; Robert Lindsay, Department of Physics; *Magnetization Studies of Antiferromagnetic Substances;* 2 years; $11,600

UTICA COLLEGE OF SYRACUSE UNIVERSITY, Utica, N. Y.; Peter Fong, Department of Physics; *Theory of Nuclear Fission;* 2 years, $6,500

WASHINGTON UNIVERSITY, St. Louis, Mo.; J. P. Hurley, Department of Physics; *Photon Splitting by the Coulomb Field;* 1 year; $9,000

UNIVERSITY OF WISCONSIN, Madison, Wis.; Julian E. Mack, Department of Physics; *Structure of Atomic Spectra;* 2 years; $31,500

UNIVERSITY OF WYOMING, Laramie, Wyo.; Frederick J. Bueche, Department of Physics; *Mechanical Properties of High Polymers;* 2 years; $10,300

YALE UNIVERSITY, New Haven, Conn.; Henry A. Fairbank, Department of Physics; *Experimental Research in Low Temperature Physics;* 2 years; $29,400

REGULATORY BIOLOGY

VICTOR H. DROPKIN, Nematode Research Laboratory, U. S. Department of Agriculture, Seaford, N. Y.; *A Bioassay of Root-Knot Nematodes Parasitic on Plants;* 6 months; $800

UNIVERSITY OF ARIZONA, Tucson, Ariz.; William J. McCauley, Department of Zoology; *The Water Balance and Respiratory Metabolism of the Gila Monster;* 3 years; $12,000

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; Charles D. Wood and Joseph E. Stone, Department of Physiology and Pharmacology; *Alterations Produced by Drugs to the Central Nervous System;* 2 years; $20,100

BARNARD COLLEGE, New York, N. Y.; Aubrey Gorbman, Department of Zoology; *Comparative Physiology of Thyroid Function;* 3 years; $28,700

BOSTON UNIVERSITY, Boston, Mass.; John D. Ifft, Department of Anatomy, School of Medicine; *Relationship of the Hypothalamus to the Gonadotrophic Activities of the Pituitary;* 3 years; $17,100

Alfred B. Chaet, Department of Physiology, School of Medicine; *Toxic Factors in Heat Death;* 2 years; $13,050

Rae Whitney, Department of Biology; *Responses to Homo-Transplants in Hamsters as a Function of Inbreeding;* 1 year; $1,150

BUCKNELL UNIVERSITY, Lewisburg, Pa.; Roger H. Bowman, Department of Biology; *Growth Hormone Content of the Pituitary as Affected by Age;* 2 years; $5,500

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; Simon Rodbard, Chronic Disease Research Institute; *Regulation of the Circulating Plasma Volume by the Autonomic Nervous System;* 2 years; $12,400

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; C. A. G. Wiersma, Division of Biology; *Integrative Action of the Crustacean Nervous System;* 3 years; $39,900

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Alden S. Crafts, Department of Botany, Davis; *Uptake, Distribution, and Fate of Isotopically Labeled Compounds in Plants;* 2 years; $6,700

Thomas W. James and Theodore L. Jahn, Department of Zoology, Los Angeles, Calif., *Synchronously Dividing Cells;* 3 years; $36,800

S. H. Madin, Department of Bacteriology, Naval Biological Laboratory; *Characterization of an Unknown Lethal Virus of Swine;* 2 years; $18,600

John H. Phillips, Department of Bacteriology; *The Immune Mechanisms of Invertebrates;* 2 years; $13,100

Charles H. Sawyer, Department of Anatomy, School of Medicine, Los Angeles; *Central Nervous Mechanisms Controlling the Neurohypophysis;* 3 years; $21,300

Beatrice M. Sweeney, Biology Division, Scripps Institution of Oceanography, La Jolla, Calif.; *Endogenous Diurnal Rhythm in Cell Division in Marine Dinoflagellates;* 3 years; $14,100

CITY COLLEGE OF NEW YORK, New York, N. Y.; William Etkin, Department of Biology; *Secretory Function of the Pituitary in the Absence of its Nerve Supply;* 2 years; $16,900

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; Frank B. Salisbury, Department of Botany and Plant Physiology; *The Influence of Growth Regulators Upon Flowering;* 2 years; $13,400

UNIVERSITY OF COLORADO, Boulder, Colo.; Robert Samuels, Department of Microbiology, Medical Center, Denver, Colo.; *Nutrition of Tritrichomonas Augusta;* 2 years; $8,800

COLUMBIA UNIVERSITY, New York, N. Y.

Herbert Elftman, Department of Anatomy; *Effect of Transplantation on the Cytology of the Pituitary;* 1 year; $5,400

Harry Grundfest, Department of Neurology; *Fundamental Mechanisms of Bioelectric Activity;* 5 years; $75,900

Beatrice C. Seegal, Department of Microbiology; *Immunological Mechanisms in Experimental Nephritis;* 1 year; $12,880

CONNECTICUT COLLEGE FOR WOMEN, New London, Conn.; John F. Kent, Department of Zoology; *Functional Significance of the Gastrointestinal Argentaffin Cells;* 3 years; $13,100

CORNELL UNIVERSITY, Ithaca, N. Y.

Damon Boynton, Department of Pomology; *Natural Growth Regulators and Intermediary Nitrogenous Compounds in Growth and Flower Initiation;* 2 years; $11,800

A. van Tienhoven, Department of Poultry Husbandry; *Neural Control of Ovulation;* 3 years; $12,100

DE PAUL UNIVERSITY, Chicago, Ill.; John R. Cortelyou, Department of Biological Sciences; *Parathyroid Glands in Anuran Amphibians;* 2 years; $8,300

DUKE UNIVERSITY, Durham, N. C.

John W. Everett, Department of Anatomy; *Neural Mechanisms Controlling the Pituitary Gland;* 2 years; $16,750

Talmage L. Peele, Department of Anatomy; *Interdependence of Amygdala and Hypothalamus;* 2 years; $20,000

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; Eugene M. Renkin, Department of Physiology, School of Medicine; *Regulatory Mechanisms in Blood Circulation;* 2 years; $15,500

HARVARD UNIVERSITY, Cambridge, Mass.; Frederick L. Hisaw, Department of Biology; *Reproductive Hormonal Processes in Elasmobranch Fishes and Ascidians;* 2 years; $9,400

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE, Manhattan, Kans.; Byron S. Miller and John A. Johnson, Department of Flour and Feed Milling Industries; *Resistance of the Wheat Plant to Attack by the Hessian Fly;* 3 years; $8,700

UNIVERSITY OF KANSAS, Lawrence, Kans.; H. W. Barrett, Department of Biochemistry; *Intestinal Absorption of Peptides;* 2 years; $8,700

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; Warren S. Rehm, Department of Physiology; *Electrophysiological Studies on Gastric Mucosa;* 3 years; $35,300

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; W. J. Hooker, Department of Botany and Plant Pathology; *Virus Multiplication as Influenced by Inherent Resistance of the Plant Host;* 2 years; $13,000

UNIVERSITY OF MISSOURI, Columbia, Mo.

J. Levitt, Department of Botany; *Physiological Basis of Resistance of Plants to Frost and Drought;* 2 years; $12,500

Thomas D. Luckey, Department of Biochemistry; *Role of Intestinal Microorganisms in Vitamin Nutrition in the Chicken;* 3 years; $28,400

NEW YORK UNIVERSITY, New York, N. Y.; William B. Hebard, Department of Biology; *Species, Age, and Seasonal Variation in Amphibian Blood Composition;* 3 years; $8,400

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; Robert P. Upchurch, Department of Field Crops; *Uptake of Organic Substances by Plant Roots;* 3 years; $23,900

OHIO STATE UNIVERSITY, Columbus, Ohio; Leo A. Sapirstein, Department of Physiology; *Movement of Dissolved Materials Between the Circulating Blood and Cells;* 2 years; $25,800

OREGON STATE COLLEGE, Corvallis, Oreg.; Carroll W. Fox, Department of Dairy and Animal Husbandry; *Dietary Influences on Fertility;* 1 year; $6,100

Austin Pritchard, Department of Zoology; *Action of Thyroid Hormone in Embryonic Sharks;* 1 year; $1,200

UNIVERSITY OF OREGON, Eugene, Oreg.; George M. Austin, Division of Neurosurgery Medical School, Portland, Oreg.; *Single Cell Activity of Spinal Cord in Relation to Intraspinal Sprouting of New Terminals;* 2 years; $24,100

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; William S. Yamamoto, Department of Physiology, School of Medicine; *Regulation of the Arterial CO_2 Concentration;* 3 years; $13,100

PRINCETON UNIVERSITY, Princeton, N. J.; Colin S. Pittendrigh, Department of Biology; *Physiological and Chemical Study of the Mechanisms of Biological Clocks;* 3 years; $30,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.

George A. Gries, Department of Botany and Plant Pathology; *Senescence of Plant Roots;* 1 year; $900

Richard C. Sanborn, Department of Biological Sciences; *The Extracellular Fluid of Arthropods;* 2 years; $12,100

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Terence A. Rogers, Department of Physiology, School of Medicine and Dentistry;

Distribution of Magnesium in Tissues; 1 year; $7,500

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; W. Rei Robbins, Department of Plant Physiology; *Physiologically Active and Inactive Forms of Iron in Plants;* 1 year; $2,000

ST. JOHN'S UNIVERSITY, Brooklyn, N. Y.; Daniel M. Lilly, Department of Biology; *Growth and Nutrition in Hypotrichous Ciliates;* 2 years; $14,000

SOUTHWESTERN LOUISIANA INSTITUTE, Lafayette, La.; Velvl W. Greene, Department of Bacteriology; *Interaction of Pure Strains of Lactic Streptococci;* 2 years; $5,300

UNIVERSITY OF TEXAS, Austin, Tex.; Sidney Ochs, Department of Physiology, Medical Branch, Galveston, Tex.; *Surface Responses From the Cerebral Cortex Elicited by Stimulation;* 3 years; $9,600

UNIVERSITY OF TORONTO, Toronto, Canada; D. S. Van Fleet, Department of Botany; *Cell Division and Differentiation in Plants;* 1 year; $2,350

TRINITY UNIVERSITY, San Antonio, Tex.; William A. Kratz, Department of Biology; *Thermal Tolerant and Thermophilic Algae;* 2 years; $7,100

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; Harold Baer, Department of Microbiology, School of Medicine; *Properties and Uses of Fluorescent Antibodies;* 2 years; $17,000

UNIVERSITY OF UTAH, Salt Lake City, Utah; James R. King, Department of Experimental Biology; *Avian Energy Metabolism;* 3 years; $15,000

VALPARAISO UNIVERSITY, Valparaiso, Ind.

W. C. Gunther, Department of Biology; *Seasonal Variation of Reproductive Organs and Endocrine Glands;* 1 year; $1,600

Robert J. Hanson, Department of Biology, *The Phagocytosis of Influenza Virus;* 3 years; $8,880

WALDEMAR MEDICAL RESEARCH FOUNDATION, INC., Port Washington, Long Island, N. Y.; Norman Molomut, Scientific Director; *The Effects of Neurogenic Stress on Tissue Regeneration;* 18 months; $14,500

WAYNE STATE UNIVERSITY, Detroit, Mich.; Walter Chavin, Department of Biology; *Nature and Role of the Thyroid Hormone in Primitive Vertebrates;* 2 years; $13,000

WILKES COLLEGE, Wilkes-Barre, Pa.; Charles B. Reif, Department of Biology; *Protoplasmic Similarities Between Green and Colorless Forms of Euglena;* 2 years; $7,400

UNIVERSITY OF WISCONSIN, Madison, Wis.

Harold R. Wolfe, Department of Zoology; *Relation of Age to Antibody Response;* 2 years; $18,000

Charles M. Weise, Department of Zoology; *Physiological Factors Influencing Migration and Molt in Birds;* 2 years; $6,500

YALE UNIVERSITY, New Haven, Conn.

Philip B. Cowles, Department of Microbiology; *Bacteriophagy and Bacteriocinogeny;* 2 years; $11,000

Jerome P. Sutin, Department of Anatomy, School of Medicine; *Central Nervous System Mechanisms Regulating Food Intake;* 3 years; $26,900

SOCIOLOGICAL SCIENCES

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Richard C. Atkinson, Department of Psychology, Los Angeles, Calif.; *Multi-Person Decision Processes;* 1 year; $5,000

UNIVERSITY OF CHICAGO, Chicago, Ill.; Beverly Duncan, Population Research and Training Center; *Metropolitan Residential Structure;* 2 years; $10,000

CORNELL UNIVERSITY, Ithaca, N. Y.; Urie Bronfenbrenner, Department of Child Development and Family Relations; *Identification and Family Structure;* 1 year; $9,500

HARVARD UNIVERSITY, Cambridge, Mass.

R. Duncan Luce, Laboratory of Social Relations; *Mathematics of Imperfect Discrimination;* 1 year; $7,300

R. Duncan Luce, Laboratory of Social Relations; *Individual Choice Behavior;* 3 years; $24,500

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Clinton De Sota, Department of Psychology; *Conceptual Learning of Relationships;* 2 years; $7,100

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.

Daniel Lerner, Center for International Studies; *Soviet Science;* 1 year; $13,800

Marvin E. Shaw, School of Industrial Management; *Use of Information in Small Groups;* 2 years; $9,700

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Robert B. Zajonc, Research Center for Group Dynamics; *Selective Factors in Cognition;* 3 years; $25,200

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Harold H. Kelley, Laboratory of Research and Social Relations; *Patterns of Interdependency in Small Groups;* 3 years; $20,300

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Daniel O. Price, Institute for Research in Social Science; *Computer Research in Demography;* 1 year; $9,900

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Dorothy S. Thomas, Department of Sociology; *Migration Differentials;* 2 years; $20,200

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; John W. Riley, Jr., Department of Sociology; *Statistical Methods for Social System Data;* 3 years; $14,600

SYSTEMATIC BIOLOGY

ALLEGHENY COLLEGE, Meadville, Pa.; Robert E. Bugbee, Department of Biology; *Revision of North American Species of Eurytoma;* 2 years; $2,000

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N. Y.

Joseph C. Moore, Department of Mammals; *Revision of the Indomalayan Sciuridae;* 1 year; $2,700

Nicholas S. Obraztsov, Department of Insects and Spiders; *Revision of North American Tortricidae;* 2 years; $12,000

AMHERST COLLEGE, Amherst, Mass.; Albert E. Wood, Department of Biology, *Evolution of Early Rodents and Lagomorphs;* 3 years; $8,000

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; Herndon G. Dowling, Department of Zoology; *American Species of Elaphe (Reptilia)*; 2 years; $9,000

BERNICE P. BISHOP MUSEUM, Honolulu, T. H.; J. Linsley Gressitt, Department of Entomology; *Zoogeography and Evolution of Pacific Insects;* 2 years; $25,000

BOSTON UNIVERSITY, Boston, Mass.; Arthur G. Humes, Department of Biology; *Copepoda (Crustacea) of Africa and Madagascar;* 1 year; $4,800

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Martin W. Johnson, Scripps Institution of Oceanography, La Jolla, Calif.; *Taxonomic and Zoogeographic Studies of Copepods (Crustacea);* 1 year; $2,100

Maynard F. Moseley, Department of Botany, Santa Barbara College, Goleta, Calif.; *Morphological Studies of Nymphaeaceae;* 3 years; $8,000

Irwin M. Newell, Division of Life Science, Riverside; *Correlation of Larvae and Adults of Polytrichous Trombidiform Mites;* 3 years; $16,800

Ruben A. Stirton, Museum of Paleontology; *Tertiary Mammals of Australia;* 2 years; $7,100

CANISIUS COLLEGE, Buffalo, N. Y.; John L. Blum, Department of Biology; *Composition and Phytogeography of the Coastal Vaucheria Belt;* 2 years; $3,800

CHICAGO ACADEMY OF SCIENCES, Chicago, Ill.; Dr. Howard K. Gloyd, Director; *The Crotalid Snake Genus Agkistrodon;* 2 years; $4,400

UNIVERSITY OF CHICAGO, Chicago, Ill.; Barbara F. Palser, Department of Botany; *Floral Morphology of the Ericales;* 2 years; $10,000

CLAREMONT GRADUATE SCHOOL, Claremont, Calif.; Sherwin Carlquist, Department of Botany; *Wood Anatomy of Compositae;* 3 years; $7,300

COLLEGE OF MEDICAL EVANGELISTS, Loma Linda, Calif.; Bruce W. Halstead and F. Rene Modglin, Department of Biotoxicology; *Phylogenetic Relationships in Stingrays;* 2 years; $9,000

COLORADO STATE UNIVERSITY, Fort Collins, Colo.; Tyler A. Woolley, Department of Zoology; *Systematics of Oribatid Mites;* 3 years; $12,000

UNIVERSITY OF CONNECTICUT, Storrs, Conn.; James A. Slater, Department of Zoology and Entomology; *Systematic Studies of the Family Lygaeidae (Hemiptera);* 4 years; $18,000

CORNELL UNIVERSITY, Ithaca, N. Y.

Helen J. Illick, Biology Department, Russell Sage College, Troy, N. Y.; *Morphology of the Lateral-Line System in Cyprinidae;* 1 year; $1,750

Edward C. Raney, Department of Conservation; *Systematics and Speciation in Fishes;* 1 year; $8,300

Charles G. Sibley, Department of Conservation; *Paper Electrophoresis As a Method in Avian Taxonomy;* 1 year; $5,400

DUKE UNIVERSITY, Durham, N. C.

H. L. Blomquist, Department of Botany; *Systematics of Sphagnum in North America;* 2 years; $8,400

Robert L. Wilbur, Department of Botany; *A Systematic Study of the Genus Amorpha (Leguminosae);* 2 years; $4,600

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.

Robert K. Godfrey, Department of Biological Sciences; *Vascular Plants of Aquatic Marsh Habitats of Western Florida;* 2 years; $6,000

Robert B. Short, Department of Biological Sciences; *Taxonomic Studies of Dicyemid Mesozoa;* 2 years; $6,300

UNIVERSITY OF FLORIDA, Gainesville, Fla.

Coleman J. Goin, Department of Biology; *Systematics and Evolution of the Amphibia;* 2 years; $2,400

William J. Riemer, Florida State Museum; *Herepetofauna of the Apalachicola Basin;* 3 years; $7,400

Minter J. Westfall, Jr., Department of Biology; *Systematic Studies of North American Zygoptera;* 3 years; $15,000

GRINNELL COLLEGE, Grinnell, Iowa.

Kenneth A. Christiansen, Department of Biology; *Systematic Studies of Collembola;* 2 years; $5,400

Norman H. Russell, Department of Biology: *The Genus Viola in North America;* 3 years; $11,600

HARVARD UNIVERSITY, Cambridge, Mass.

Richard A. Howard, Arnold Arboretum; *Flora of the Lesser Antilles;* 3 years; $21,000

I. Mackenzie Lamb, Farlow Herbarium; *New Index of Lichens;* 2 years; $3,900

Herbert W. Levi, Museum of Comparative Zoology; *Type Species of Rare Spider Genera;* 1 year; $2,200

Alfred S. Romer, Museum of Comparative Zoology; *Study of Carboniferous Tetrapods;* 2 years; $7,800

Alfred S. Romer, Museum of Comparative Zoology; *Triassic Vertebrates of Argentina;* 1 year; $3,000

Ernest E. Williams, Museum of Comparative Zoology; *Systematics and Ecology of Anolis in Cuba;* 2 years; $9,700

UNIVERSITY OF HAWAII, Honolulu, T. H.; Leonard D. Tuthill, Department of Entomology; *Insects of Hawaii;* 3 years; $37,500

IDAHO STATE COLLEGE, Pocatello, Idaho; Marie L. Hopkins, Department of Zoology; *Bison Latifrons and Associated Pleistocene Fauna;* 3 years; $4,800

UNIVERSITY OF ILLINOIS, Urbana, Ill.

Donald P. Rogers, Department of Botany; *Lower Basidiomycetes of Oregon;* 2 years; $10,000

Milton W. Sanderson, State Natural History Survey Division; *West Indian Species of Phyllophaga (Coleoptera);* 3 years; $8,800

Wilson N. Stewart, Department of Botany; *Petrifaction Fossils of the Pennsylvania period;* 3 years; $10,000

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Robert F. Thorne, Department of Botany; *Vascular Plants of Iowa;* 3 years; $10,000

KAISER FOUNDATION, Oakland, Calif.; Benjamin G. Chitwood, Laboratory of Comparative Physiology and Morphology; *Marine Nematodes and Other Scolecidans;* 2 years; $12,000

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE, Manhattan, Kans.; Reginald H. Painter, Department of Entomology;

Taxonomic Study of Poecilanthrax (Diptera) ; 2 years ; $2,000

UNIVERSITY OF KANSAS, Lawrence, Kans.

Robert W. Baxter, Department of Botany ; *The Pennsylvanian Fossil Flora of Eastern Kansas ;* 3 years ; $11,600

E. Raymond Hall, Department of Zoology ; *Systematics Studies of North American Mammals ;* 3 years ; $11,000

Ronald L. McGregor, Department of Botany ; *A Biosystematic Study of Echinacea (Compositae)* ; 2 years ; $5,300

UNIVERSITY OF MAINE, Orono, Maine.

Gordon E. Gates, Department of Zoology ; *Classification of Oligochasta ;* 4 years ; $26,000

Martin A. Rosinski, Department of Botany and Plant Pathology ; *Morphology and Cytology of Ceratocystis ;* 2 years ; $3,700

UNIVERSITY OF MARYLAND, College Park, Md. ; G. W. Wharton, Department of Zoology ; *Basic Research in Acarology ;* 3 years ; $27,800

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass. ; Charles P. Alexander, Department of Entomology ; *Crane-Flies of Western North America ;* 2 years ; $3,200

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich. ; Henry A. Imshaug ; Department of Botany and Plant Pathology ; *Taxonomic and Phytogeographic Study of West Indian Lichens ;* 3 years ; $19,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.

Claude W. Hibbard, Museum of Paleontology ; *Pleistocene Faunas of the High Plains Region ;* 3 years ; $18,600

Warren H. Wagner, Department of Botany ; *Fern Taxonomy ;* 1 year ; $8,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn. ; A. Orville Dahl, Department of Botany ; *Fine Structure of Pollen Grains ;* 2 years ; $11,000

MISSOURI BOTANICAL GARDEN, St. Louis, Mo. ; Julian A. Steyermark, Research Department ; *Revised Catalogue of Missouri Flora ;* 1 year ; $1,750

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.

Marian H. Pettibone, Department of Zoology ; *Polychaetous Annelids of New England ;* 4 years ; $15,000

Emery F. Swan, Department of Zoology ; *Growth and Variation in Sea Urchins (Echinoidea) ;* 4 years ; $18,600

NEW YORK BOTANICAL GARDEN, New York, N. Y. ; David D. Keck ; Assistant Director and Head Curator ; *Studies in Systematic Botany ;* 1 year ; $30,000

NEW YORK ZOOLOGICAL SOCIETY, New York, N. Y. ; Myron Gordon, Genetics Laboratory ; *A Biological Synthesis of the Poeciliid Fishes ;* 2 years ; $11,000

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.

Clyde F. Smith, Division of Biological Sciences ; *Catalogue of the Homoptera of the World ;* 1 year ; $6,900

Theodore B. Mitchell, Division of Biological Sciences ; *Native Bees of the Eastern United States ;* 3 years ; $34,000

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C. ; Albert E. Radford, Department of Botany ; *Flora of North and South Carolina ;* 2 years ; $16,000

Austin B. Williams, Institute of Fisheries Research ; *Decapod Crustaceans of the Southeastern United States ;* 3 years ; $8,000

OKLAHOMA STATE UNIVERSITY AND APPLIED SCIENCE, Stillwater, Okla. ; George A. Moore, Department of Zoology ; *Comparative Morphology of Sunfishes ;* 2 years ; $7,000

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla. ; Norman H. Boke, Department of Plant Sciences, University of Oklahoma ; *Developmental Anatomy of Cactaceae ;* 3 years ; $16,200

OREGON STATE COLLEGE, Corvallis, Oreg.

Harold J. Jensen, Department of Botany and Plant Pathology ; *Survey of Marine Nematodes ;* 3 years ; $9,900

Herman A. Scullen, Department of Entomology ; *Taxonomic Studies of Cercerini ;* 2 years ; $5,800

William P. Stephen, Department of Entomology ; *Systematic Studies of Apidae ;* 3 years ; $9,400

RANCHO SANTA ANA BOTANIC GARDEN, Claremont, Calif. ; Philip A. Munz, Director ; *Cytological and Systematic Investigations of Onagraceae ;* 3 years ; $10,600

ROOSEVELT UNIVERSITY, Chicago, Ill. ; Charles H. Seevers, Department of Biology ; *Systematics and Evolution of the Staphylinidae ;* 3 years ; $6,900

RUSSELL SAGE COLLEGE, Troy, N. Y. ; Geneva Sayre, Department of Biology ; *Nomenclature and Classification of Bryophytes ;* 1 year ; $8,500

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.

Ruth E. Gordon, Institute of Microbiology ; *Taxonomic Study of Actinomycetes ;* 3 years ; $20,000

Marion A. Johnson, Department of Botany ; *Serological Study of Festuceae ;* 3 years ; $15,000

ST. JOHN FISHER COLLEGE, Rochester, N. Y. ; Ross H. Arnett, Jr., Department of Biology ; *Speciation of Oedemerid Beetles ;* 2 years ; $3,500

SMITHSONIAN INSTITUTION, Washington, D. C.

Carl J. Drake, Department of Zoology ; *Monographic Studies of Tingidae and Presmidae (Hemiptera)* ; 2 years ; $19,000

Mason E. Hale, Jr. ; Department of Botany ; *Lichens of West Virginia ;* 1 year ; $1,650

Porter M. Kier, Department of Geology *Studies of Cassiduloida (Echinoidea)* ; 1 year ; $2,700

Floyd A. McClure, Department of Botany ; *Taxonomy of the Bamboos ;* 2 years ; $14,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif. ; John S. Garth, Department of Biology ; *Xanthidae of the Pacific American Coast ;* 2 years ; $11,500

SOUTHWESTERN LOUISIANA INSTITUTE, Lafayette, La. ; William D. Reese, Department of Biology ; *The Moss Genus Calymperes in South America ;* 2 years ; $3,300

STANFORD UNIVERSITY, Stanford, Calif. ; George S. Myers, Natural History Museum ; *Systematic Study of Zeomorph Fishes ;* 3 years ; $16,000

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.

Arthur C. Cole, Jr., Department of Entomology ; *The Ant Genus Pogonomyrmex ;* 2 years ; $6,000

Aaron J. Sharp, Department of Botany; *Vascular Plants of Tennessee;* 3 years; $15,000

TEXAS RESEARCH FOUNDATION, Renner, Tex.; Donovan S. Correll, Botanical Laboratory; *Section Tuberarium of* Solanum *in North, Central and South America;* 3 years; $14,000

UNIVERSITY OF TEXAS, Austin, Tex.

W. Frank Blair, Department of Zoology; *Speciation in Amphibian Populations;* 3 years; $15,300

Harold C. Bold, Department of Botany: *Algae of Texas Soils;* 1 year; $6,000

Clark Hubbs, Department of Zoology, *Speciation in Fish Population;* 3 years; $11,800

Wilson S. Stone and Marshall R. Wheeler, Department of Zoology; *Drosophilidae of the Caribbean Regions;* 3 years; $25,000

UNIVERSITY OF TULSA, Tulsa, Okla.; Albert F. Blair and Hague L. Lindsay, Jr., Department of Life Sciences; *Population Studies of Plethodontid Salamanders;* 2 years; $2,800

UNIVERSITY OF UTAH, Salt Lake City, Utah; George F. Edmunds, Department of Zoology and Entomology; *Higher Classification of Ephemeroptera;* 2 years; $6,300

VALPARAISO UNIVERSITY, Valparaiso, Ind.; Carl H. Krekeler, Department of Biology; *Systematic Studies of Cavernicolous Coleoptera;* 3 years; $4,500

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; Hubert W. Vogelmann, Department of Botany; *A Study of Pringle's Undistributed Botanical Collections;* 2 years; $6,400

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; Perry C. Holt, Biology Department; *Systematic Studies of Branchiobdellidae;* 2 years; $5,800

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Paul L. Illig, Department of Zoology; *Systematics of Crustacia;* 2 years; $17,700

WASHINGTON UNIVERSITY, St. Louis, Mo.; Carroll W. Dodge, Henry Shaw School of Botany; *Lichen Flora of the Antarctic Continent;* 2 years; $13,100

UNIVERSITY OF WISCONSIN, Madison, Wis.; John W. Thomson, Department of Botany: *A Manual of American Arctic Lichens;* 2 years; $8,000

YOUNGSTOWN UNIVERSITY, Youngstown, Ohio; Fred H. Glenny, Department of Biology; *The Aortic Arch System of Birds:* 1 year; $1,300

CONTINUING ANTARCTIC RESEARCH

Antarctic Field Operations

U. S. WEATHER BUREAU, Washington, D. C.; F. W. Reichelderfer, Chief; *Conduct of Antarctic Field Operations;* 2 years; $51,500

Aurora and Airglow

ARCTIC INSTITUTE OF NORTH AMERICA, New York, N. Y.; Walter A. Wood, Director; *Conduct of the Aurora and Airglow Program;* 2 years; $20,000

Biology and Medicine

ARCTIC INSTITUTE OF NORTH AMERICA, New York, N. Y.; Walter A. Wood, Director; *Establishment of a Biological Laboratory at the Antarctic McMurdo Base;* 2 years; $82,000

Executive Direction

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.; G. D. Meid, Business Manager; *Committee on Polar Research;* 1 year; $30,000

Geomagnetism

U. S. COAST AND GEODETIC SURVEY, Washington, D. C.; H. Arnold Karo, Director; *Conduct of Geomagnetism Program;* 2 years; $10,000

Glaciology

ARCTIC INSTITUTE OF NORTH AMERICA, New York, N. Y.

Walter A. Wood, Director; *Conduct of Program in Traverse Seismology;* 2 years; $42,000

Walter A. Wood, Director; *Conduct of Station and Traverse Glaciology;* 2 years; $265,000

Ionospheric Physics

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; A. V. Astin, Director; *Conduct of Ionospheric Physics Program;* 2 years; $109,300

Meteorology

U. S. WEATHER BUREAU, Washington, D. C.; F. W. Reichelderfer, Chief; *Conduct of Meteorology Program;* 2 years; $301,000

Oceanography

WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; John McGilvray, Business Manager; *Procurement of Deep Water Large Sample Bottles;* 1 year; $2,000

Station Seismology

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Frank Press, Director, Seismological Laboratory; *Seismology Observations at Wilkes Station;* 2 years; $2,500

COLUMBIA UNIVERSITY, New York, N. Y.; Maurice Ewing, Director, Lamont Geological Observatory; *Seismology Observations at Hallett Station;* 2 years; $2,500

U. S. COAST AND GEODETIC SURVEY, Washington, D. C.; H. Arnold Karo, Director; *Seismology Observations at Byrd and South Pole Stations;* 2 years; $5,000

GENERAL

AMERICAN PHYSIOLOGICAL SOCIETY, Washington, D. C.; Louis N. Katz, President; *Program of Summer Research for Teachers of College Physiology;* 1 year; $50,000

UNIVERSITY OF ARIZONA, Tucson, Ariz., Kenneth F. Wertman, Department of Bacteriology; *Purchase of an Electron Microscope for Basic Research;* 1 year; $30,200

BAYLOR UNIVERSITY, Waco, Tex.; Stanley W. Olson, Dean, College of Medicine, Texas Medical Center, Houston, Tex.; *Short Term Research by Medical Students;* 3 years; $12,000

BERMUDA BIOLOGICAL STATION, St. George's West, Bermuda; W. H. Sutcliffe, Jr., Director; *Research at the Bermuda Biological Station;* 5 years; $12,500

COLUMBIA UNIVERSITY, New York, N. Y.; Willard C. Rappleye, Dean, College of Physicians and Surgeons; *Short Term Research by Medical Students;* 3 years; $12,000

DUKE UNIVERSITY, Durham, N. C.; Kenneth E. Penrod, Assistant Dean, School of Medicine; *Short Term Research by Medical Students;* 3 years; $10,800

UNIVERSITY OF FLORIDA, Gainesville, Fla.; George T. Harrell, Dean, The College of Medicine; *Short Term Research by Medical Students;* 3 years; $3,600

GULF COAST RESEARCH LABORATORY, Ocean Springs, Miss.; Gordon Gunter, Director; *Summer Research at the Gulf Coast Research Laboratory;* 2 years; $12,000

HAHNEMANN MEDICAL COLLEGE AND HOSPITAL, Philadelphia, Pa.; Harold A. Taggart, Associate Dean; *Short Term Research by Medical Students;* 3 years; $12,000

HARVARD UNIVERSITY, Cambridge, Mass.; F. M. Carpenter, Department of Biology; *An Electron Microscope for Biological Research;* 1 year; $32,800

HIGHLAND BIOLOGICAL STATION, INC., Highlands, N. C.; Thelma Howell, Executive Director; *Summer Research at the Highlands Biological Station;* 3 years; $17,400

UNIVERSITY OF KANSAS, Kansas City, Kans.; Alvar A. Werder, Chairman of the Research Committee, School of Medicine; *Short Term Research by Medical Students;* 3 years; $10,800

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; A. H. Stockard, Director, University of Michigan Biological Station; *Summer Research at the University of Michigan Biological Station;* 2 years; $15,100

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Robert B. Howard, Associate Dean, The Medical School; *Short Term Research by Medical Students;* 3 years; $12,000

NEW YORK UNIVERSITY, New York, N. Y.; W. N. Hubbard, Jr., Associate Dean, New York University College of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

NORTHWESTERN UNIVERSITY, Evanston, Ill.; Richard H. Young, Dean, The Medical School, Chicago, Ill.; *Short Term Research by Medical Students;* 3 years; $12,000

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; Donald G. Anderson, Dean, School of Medicine and Dentistry; *Short Term Research by Medical Students;* 3 years; $12,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Frederick J. Moore, Research Committee, School of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

UNIVERSITY OF TEXAS, Austin, Tex.; John B. Truslow, Executive Director, Medical Branch, Galveston, Tex.; *Short Term Research by Medical Students;* 3 years; $12,000

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; M. E. Lapham, Dean, The School of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

UNIVERSITY OF UTAH, Salt Lake City, Utah; Philip B. Price, Dean, College of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

VANDERBILT UNIVERSITY, Nashville, Tenn.; John B. Youmans, Dean, The School of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

UNIVERSITY OF WISCONSIN, Madison, Wis.; F. E. Shideman, Chairman, Committee on Scholarships and Fellowships of the Medical School; *Short Term Research by Medical Students;* 3 years; $12,000

WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY, Shrewsbury, Mass.; Hudson Hoagland, Executive Director; *Distilling Equipment for Hazardous Volatile Solvents;* 1 year; $4,500

YESHIVA UNIVERSITY, New York, N. Y.; Marcus D. Kogel, Dean, Albert Einstein College of Medicine; *Short Term Research by Medical Students;* 3 years; $12,000

FACILITIES

BOTANICAL SOCIETY OF AMERICA, INC., Pasadena, Calif.; F. W. Went, President; *Feasibility Study for Construction of a Controlled Environment Facility;* 1 year; $20,200

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Stanislavs Vasilevskis, Lick Observatory; *Design of Equipment Consisting of an Automatic Machine for Measuring Astrographic Positions and Magnitudes;* 1 year; $67,200

HARVARD UNIVERSITY, Cambridge, Mass.; Alfred S. Romer, Director, Museum of Comparative Zoology; *Museum Facilities for Research in Systematic Zoology and Paleontology;* 5 years; $300,000

UNIVERSITY OF HAWAII, Honolulu, T. H.; A. H. Banner, Acting Director; *Improvement of Research Facilities at the Hawaii Marine Laboratory;* 1 year; $13,500

INDIANA UNIVERSITY, Bloomington, Ind.; Ralph E. Cleland, Botany Department; *A Controlled Environment Room for Botanical Research;* 1 year; $25,000

IOWA STATE COLLEGE, Ames, Iowa; R. M. Stewart, Department of Physics; *Construction of a High Speed Digital Computer;* 1 year; $50,000

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Philip B. Armstrong, Director; *Construction of a Research Building and of Housing for Basic Biological and Medical Sciences;* 3 years; $544,250

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; S. E. Warschawski, Department of Mathematics; *Acquisition of a High Speed Digital Computer;* 1 year; $100,000

UNIVERSITY OF OKLAHOMA, Norman, Okla.; Gerald S. Tuma, School of Electrical Engineering; *Construction of a High Speed Digital Computer;* 1 year; $50,000

UNIVERSITY OF VIRGINIA, Charlottesville, Va.
Horton H. Hobbs, Jr., Director; *Improvement of Research Facilities at the Mountain Lake Biological Station;* 1 year; $5,200
Lawrence R. Quarles, Dean of the School of Engineering; *Research Reactor Facility;* 2 years; $150,000

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; Harold W. Dodgen, Department of Chemistry; *Research Reactor Facility;* 2 years; $300,000

YALE UNIVERSITY, New Haven, Conn.; Edgar J. Boell, Department of Zoology; *Facility for a Recirculating Sea-Water System;* 1 year; $4,700

APPENDIX D

Grants Other Than Research

Fiscal Year 1958

CONFERENCES IN SUPPORT OF SCIENCE

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, Philadelphia, Pa.; *Systematic Biology in Private Institutions;* $4,200

AMERICAN INSTITUTE OF ARCHITECTS, Washington, D. C.; *Conference on Basic Research in Architecture;* $6,000

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.

The Physiological Relations Between Nucleus and Cytoplasm; 1 week; $2,900

Conference on Extrachromosomal Heredity; 5 days; $3,600

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, New York, N. Y.; *Industry-University Conference on Research on Electrical Engineering;* $2,500

AMERICAN ORNITHOLOGIST'S UNION, Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; *Recent Advances in Ornithological Research;* $2,800

AMERICAN PHYTOPATHOLOGICAL SOCIETY, Connecticut Agricultural Experiment Station, New Haven, Conn.; *Symposium on Plant Pathology;* $3,400

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York, N. Y.; *Joint Meeting of the International Association for Bridge and Structural Engineering and the Structural Division of the American Society of Civil Engineering;* $8,000

BIOLOGICAL ABSTRACTS, Philadelphia, Pa.; *Conference on U. S. Scientific Abstracting and Indexing Services;* $11,400

BIOMETRIC SOCIETY, Eastern North American Region, Blacksburg, Va.; *Fourth International Biometric Symposium on Biometric Genetics;* $2,500

BIOPHYSICAL SOCIETY, Cambridge, Mass.; *Symposia on the Structure and Function of Microsomal Particles and on the Nature of Muscle Protein;* $5,000

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

Conference on the Axiomatic Method in Geometry and Physics; $17,250

Symposium on Statistical Methods in Radio Wave Propagation Investigations; $2,000

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Conference on High Temperature Research;* $5,000

UNIVERSITY OF COLORADO, Boulder, Colo.; *Conference on Engineering Science Research* $5,000

COLUMBIA UNIVERSITY, New York, N. Y.

Symposium on Celestial Mechanics; $8,000

Symposium on Comparative Endrocrinology; $14,300

COUNCIL ON WAVE RESEARCH, Richmond, Calif.; *Sixth International Conference on Coastal Engineering;* $5,000

FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, Washington, D. C.; *International Symposium on Enzyme Chemistry;* $10,000

GENERAL ELECTRIC COMPANY, Schenectady, N. Y.; *Conference on the Properties of Metals at Low Temperatures;* $6,000

GENETICS SOCIETY OF AMERICA, Madison, Wis.; *Tenth International Congress of Genetics;* $20,000

GENETICS SOCIETY OF AMERICA, Austin, Tex.; *Tenth International Congress of Genetics,* Montreal, Canada; $26,000

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; *Conference on Basic Research in Civil Engineering;* $2,700

UNIVERSITY OF GEORGIA, Athens, Ga.; *Conference on Salt Marsh Research;* $10,800

UNIVERSITY OF ILLINOIS, Urbana, Ill.; *Fundamental Research in Plain Concrete;* $8,400

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; *Hyperconjugation;* 3 days; $2,000

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY, Basel, Switzerland; *40th Meeting of the Executive Committee of the International Union of Pure and Applied Chemistry;* $5,000

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; *The Chemical Basis of Development;* 1 week; $6,500

LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; *23rd Cold Spring Harbor Symposium on Quantitative Biology;* $6,500

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; *Symposium on Sulfur in Proteins;* $9,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; *Conference for Course Content Studies in Mathematics;* 2 days; $6,000

MIDWEST RESEARCH INSTITUTE, Kansas City, Mo.; *Small Angle X-ray Scattering From Metals;* $4,600

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; *Taxonomic Consequences of Man's Activities;* $1,500

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D. C.

W. W. Atwood, Jr., Office of International Relations; *A New International Council of*

Scientific Unions Committee, "Special Committee on the Contamination of Extra Terrestrial Bodies (CETEX)"; $15,000

Conference on Atmospheric Chemistry of Sulphur and Chlorine; $4,000

Fracture Colloquium; 4 days; $7,000

International Congress of Radiation Research; 6 days; $7,500

Stopping Power Conference; $5,500

RETINA FOUNDATION, Boston, Mass.; *Conference on the Structure of Mucopolysaccharides; $6,000*

UNIVERSITY OF ROCHESTER, Rochester, N. Y. *International Conference on Semiconductors;* 5 days; $5,000

THE ROCKEFELLER INSTITUTE, New York, N. Y.

A Seminar Series on Developmental Biology; $2,000

Symposium on Elementary Processes in Nerve Conduction and Muscle Contraction; $23,000

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; *Conference on Biochemical and Serological Characterization of Proteins; $1,000*

SOCIETY FOR THE STUDY OF DEVELOPMENT AND GROWTH, Washington, D. C.; *Seventeenth Growth Symposium;* 1 week; $5,700

SOCIETY OF SYSTEMATIC ZOOLOGY, Chicago, Ill.; *Two Hundred Years of Progress in Systematic Biology; $2,500*

WASHINGTON UNIVERSITY, St. Louis, Mo.; *The Midwest Conference on Theoretical Physics; $1,500*

UNIVERSITY OF WISCONSIN, Madison, Wis.; *Analysis of Composite Radiation From Stellar Systems;* 1 day; $980

EDUCATION IN THE SCIENCES

Academic-Year Institutes

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Academic-Year Institute for High School Teachers of Mathematics;* 10 months; $185,150

UNIVERSITY OF COLORADO, Boulder, Colo.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $267,000

HARVARD UNIVERSITY, Cambridge, Mass.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $264,950

UNIVERSITY OF ILLINOIS, Urbana, Ill.; *Academic-Year Institute for High School Teachers of Mathematics;* 10 months; $260,000

IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $260,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $265,000

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $266,800

OHIO STATE UNIVERSITY, Columbus, Ohio; *Academic-Year Institute For High School Teachers of Science and Mathematics;* 10 months; $247,100

OKLAHOMA STATE UNIVERSITY, Stillwater, Okla.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $265,000

OREGON STATE COLLEGE, Corvallis, Oreg.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $248,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Academic-Year Institute for High School Teachers of the Sciences;* 10 *months;* $286,000

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $265,500

STATE UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; *Academic-Year Institute for High School Teachers of Science;* 10 months; $250,000

SYRACUSE UNIVERSITY, Syracuse, N. Y.; *Academic-Year Institute for High School Teachers of Science;* 10 months; $250,050

UNIVERSITY OF TEXAS, Austin, Texas; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $270,000

UNIVERSITY OF UTAH, Salt Lake City, Utah; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $265,000

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $260,000

WASHINGTON UNIVERSITY, St. Louis, Mo.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $269,950

UNIVERSITY OF WISCONSIN, Madison, Wis.; *Academic-Year Institute for High School Teachers of Science and Mathematics;* 10 months; $261,000

In-Service Institutes

UNIVERSITY OF AKRON, Akron, Ohio; *In-Service Institute for Secondary School Teachers of Science;* 10 months; $3,900

AMERICAN UNIVERSITY, Washington, D. C.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $9,040

ANTIOCH COLLEGE, Yellow Springs, Ohio; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $13,060

ARIZONA STATE COLLEGE, Tempe, Ariz.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $9,740

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; *In-Service Institute for High School and Junior High School Teachers of Mathematics;* 10 months; $5,920

BALL STATE TEACHERS COLLEGE, Muncie, Ind.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $9,500

BOSTON COLLEGE, Chestnut Hill, Mass.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $9,200

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $7,560

BROWN UNIVERSITY, Providence, R. I.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $8,750

BRYN MAWR COLLEGE, Bryn Mawr, Pa.; *In-Service Institute for High School Teachers of Physics;* 10 months; $11,370

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $6,090

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *In-Service Institute for Secondary School Teachers of Mathematics,* at Los Angeles; 10 months; $7,140

TEACHERS COLLEGE OF COLUMBIA UNIVERSITY, New York, N. Y.; *In-Service Institute for Teachers of Mathematics;* 10 months; $10,080

DARTMOUTH COLLEGE, Hanover, N. H.; *In-Service Institute for High School Teachers of Chemistry and Biology;* 6 months; $5,000

UNIVERSITY OF DENVER, Denver, Colo.; *In-Service Institute for High School Teachers of Biology, Chemistry and General Science;* 10 months; $11,500

UNIVERSITY OF DETROIT, Detroit, Mich.; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $8,750

DRAKE UNIVERSITY, Des Moines, Iowa; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $9,680

EMORY UNIVERSITY, Emory University, Ga.; *In-Service Institute for Secondary School Teachers of Mathematics and Sciences;* 10 months; $13,000

EVANSVILLE COLLEGE, Evansville, Ind.; *In-Service Institute for Secondary School Teachers of Chemistry;* 10 months; $4,380

FISK UNIVERSITY, Nashville, Tenn.; *In-Service Institute for High School Teachers of Chemistry;* 10 months; $4,730

FORDHAM UNIVERSITY, New York, N. Y.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $4,350

GEORGE PEABODY COLLEGE FOR TEACHERS, Nashville, Tenn.; *In-Service Institute for High School Teachers of Physics;* 10 months; $3,860

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; *In-Service Institute for High School Teachers of Chemistry;* 10 months; $3,630

HAMPTON INSTITUTE, Hampton, Va.; *In-Service Institute for Secondary School Teachers of Science;* 33 weeks; $5,000

HIRAM COLLEGE, Hiram, Ohio; *In-Service Institute for Secondary School Teachers of Mathematics;* 34 weeks; $6,700

COLLEGE OF THE HOLY CROSS, Worcester, Mass.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $4,400

ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; *In-Service Institute for Secondary School Teachers of Mathematics;* 38 weeks; $7,000

NORTHERN ILLINOIS UNIVERSITY, DeKalb, Ill.; *In-Service Institute for Secondary School Teachers of Science;* 10 months; $7,550

IMMACULATE HEART COLLEGE, Los Angeles, Calif.; *In-Service Institute for High School Teachers of Science and Mathematics;* 38 weeks; $7,250

INCARNATE WORD COLLEGE, San Antonio, Tex.; *In-Service Institute for High School Teachers of Biology and Chemistry;* 35 weeks; $11,040

INDIANA STATE TEACHERS COLLEGE, Terre Haute, Ind.; *In-Service Institute for High School Teachers of Science;* 10 months; $5,820

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; *In-Service Institute for High School Teachers of Science;* 10 months; $9,000

KANSAS STATE TEACHERS COLLEGE, Emporia, Kans.; *In-Service Institute for Secondary School Science and Mathematics Teachers;* 10 months; $13,500

WESTERN KENTUCKY STATE COLLEGE, Bowling Green, Ky.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $5,250

KNOX COLLEGE, Galesburg, Ill.; *In-Service Institute for Secondary School Teachers of Physics;* 10 months; $7,300

LONG BEACH STATE COLLEGE, Long Beach, Calif.; *In-Service Institute for Secondary Teachers of Mathematics and Science;* 10 months; $5,550

CENTENARY COLLEGE OF LOUISIANA, Shreveport, La.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $5,350

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $6,400

LOYOLA COLLEGE, Baltimore, Md.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $5,140

MARQUETTE UNIVERSITY, Milwaukee, Wis.; *In-Service Institute for Secondary School Teachers of Science;* 10 months; $4,400

MIAMI UNIVERSITY, Oxford, Ohio; *In-Service Institute for Secondary School Teachers in the Biological Sciences;* 10 months; $6,800

UNIVERSITY OF MIAMI, Coral Gables, Fla.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $7,250

EASTERN MICHIGAN COLLEGE, Ypsilanti, Mich.; *In-Service Institute for High School Teachers of Physics;* 10 months; $7,540

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $5,900

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; *In-Service Institute for High School Teachers of Physics;* 10 months; $6,000

MONTCLAIR STATE COLLEGE, Montclair, N. J.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $6,180

MURRAY STATE COLLEGE, Murray, Ky.; *In-Service Institute for Teachers of Secondary School Science and Mathematics Teachers;* 10 months; $6,700

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; *In-Service Institute for High School Science and Mathematics Teachers;* 10 months; $5,720

NEW YORK UNIVERSITY, New York, N. Y.; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $6,900 *In-Service Institute for High School Teachers of Earth Sciences;* 10 months; $5,120

STATE UNIVERSITY OF NEW YORK, Albany, N. Y.; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $4,450

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N. C.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $4,900

THE WOMAN'S COLLEGE OF THE UNIVERSITY OF NORTH CAROLINA; Greensboro, N. C.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $6,100

NOTRE DAME COLLEGE, St. Louis, Mo.; *In-Service Institute for Secondary School Teachers of Mathematics and Science;* 10 months; $4,110

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; *In-Service Institute for High School Teachers of Science and Mathematics;* 36 weeks; $4,790

UNIVERSITY OF OREGON, Eugene, Oreg.; *In-Service Institute for Secondary School Mathematics Teachers;* 10 months; $3,250

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; *In-Service Institute for High School Science and Mathematics Teachers;* 10 months; $13,400

UNIVERSITY OF PUERTO RICO, Mayaguez, Puerto Rico.; *In-Service Institute for Secondary School Science and Mathematics Teachers;* 10 months; $10,370

UNIVERSITY OF REDLANDS, Redlands, Calif.; *In-Service Institute for High School Teachers of Science;* 10 months; $3,550

REED COLLEGE, Portland, Oreg.: *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $10,300

ST. AUGUSTINE'S COLLEGE, Raleigh, N. C.; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $7,150

COLLEGE OF ST. THOMAS, St. Paul, Minn.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $11,500

SAN JOSE STATE COLLEGE, San Jose, Calif.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $9,120

UNIVERSITY OF SCRANTON, Scranton, Pa.; *In-Service Institute for High School Teachers of Science;* 10 months; $4,210

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, Rapid City, S. Dak.; *In-Service Institute for Secondary School Teachers of Science;* 10 months; $9,300

SOUTHEASTERN STATE COLLEGE, Durant, Okla.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $4,550

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $15,360

SOUTHERN UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; *In-Service Institute for High School Teachers of Science;* 10 months; $5,830

SPRING HILL COLLEGE, Spring Hill, Ala.; *In-Service Institute for High School Teachers of Science and Mathematics;* 10 months; $5,440

STATE UNIVERSITY TEACHERS COLLEGE, Oneonta, N. Y.; *In-Service Institute for High School and Junior High School Teachers of Mathematics;* 10 months; $5,700

TEMPLE UNIVERSITY, Philadelphia, Pa.; *In-Service Institute for Secondary School Teachers of Physics;* 10 months; $7,000

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; *In-Service Institute for Secondary School Teachers of Science and Mathematics;* 10 months; $8,400

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College Station, Tex.; *In-Service Institute for High School Teachers of Geology;* 5 months; $3,480

UNIVERSITY OF UTAH, Salt Lake City, Utah; *In-Service Institute for Junior and Senior High School Teachers of Mathematics;* 10 months; $7,860

UTAH STATE UNIVERSITY, Logan, Utah; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $7,950

VILLANOVA UNIVERSITY, Villanova, Pa.; *In-Service Institute for High School Teachers of Biology;* 10 months; $4,650

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; *In-Service Institute for High School Teachers of Mathematics;* 10 months; $4,400

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; *In-Service Institute for Junior and High School Teachers of Mathematics;* 10 months; $4,900

WAYNE STATE UNIVERSITY, Detroit, Mich.; *In-Service Institute for Secondary School Teachers of Mathematics;* 10 months; $7,500

WILLIAM JEWELL COLLEGE, Liberty, Mo.; *In-Service Institute for Secondary School Teachers of Science;* 10 months; $8,100

UNIVERSITY OF WISCONSIN, Madison, Wis.; *In-Service Institute for Secondary School Teachers of Mathematics and Science;* 10 months; $12,550

WORCESTER POLYTECHNIC INSTITUTE, Worcester, Mass.; *In-service Institute for High School Teachers of Science;* 10 months; $8,860

Summer Institutes

ADELPHI COLLEGE, Garden City, N. Y.; *Summer Institute in Radiation Biology and Chemistry for High School Teachers of Science;* 6 weeks, $45,800

ALABAMA COLLEGE, Montevallo, Ala.; *Summer Institute for High School Teachers of Science;* 6 weeks; $55,600

UNIVERSITY OF ALABAMA, University, Ala.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $53,700

UNIVERSITY OF ALASKA, College, Alaska; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $68,500

ALLEGHENY COLLEGE, Meadville, Pa.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $58,700

AMERICAN UNIVERSITY, Washington, D. C.; *Summer Institute for High School Teachers of Chemistry and Physics*; 8 weeks; $64,600

ANTIOCH COLLEGE, Yellow Springs, Ohio; *Summer Institute for High School Teachers of General Science;* 8 weeks; $80,600

UNIVERSITY OF ARIZONA, Tucson, Ariz.; *Summer Institute for High School Teachers of Science and Mathematics;* 5 weeks; $42,450

UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $71,500

ATLANTA UNIVERSITY, Atlanta, Ga.; *Summer Institute for High School Teachers of Science and Mathematics;* 9 weeks; $64,700

BAYLOR UNIVERSITY, Waco, Tex.; *Summer Institute in Science and Mathematics and Radiation Biology for High School Teachers of Science and Mathematics;* 8 weeks; $73,000

BOWDOIN COLLEGE, Brunswick, Maine; *Special Summer Institute for High School Physics Teachers in the Program of the Physical Science Study Committee;* 6 weeks; $51,550

BRIGHAM YOUNG UNIVERSITY, Provo, Utah; *Summer Institute in Radiation Biology for High School Teachers of Science;* 5 weeks; $12,300

BROWN UNIVERSITY, Providence, R. I.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $50,700

BUCKNELL UNIVERSITY, Lewisburg, Pa.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $51,150

UNIVERSITY OF BUFFALO, Buffalo, N. Y.; *Summer Institute for High School Teachers of Mathematics;* 4 weeks; $39,800

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.
Summer Institute for High School Teachers of Science and Mathematics, at Los Angeles; 6 weeks; $74,850
Summer Institute for High School Teachers of Science; 7 weeks, $120,550
Summer Institute in Radioactivity and Biology for High School Teachers of Sciences; 6 weeks; $14,500

CARLETON COLLEGE, Northfield, Minn.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks, $50,650

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio
Summer Institute for High School Teachers of Chemistry; 6 weeks; $53,050
Summer Institute for High School Teachers of Mathematics; 6 weeks; $33,100

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $57,550

CLAREMONT COLLEGE, Claremont, Calif.; *Summer Institute for High School and Junior College Teachers of Biology and General Science;* $48,550

CLARKSON COLLEGE OF TECHNOLOGY, Potsdam, N. Y.; *Summer Institute for High School Teachers of Science and Mathematics*; 8 weeks; $66,550

COLBY COLLEGE, Waterville, Maine; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks, $49,400

COLORADO COLLEGE, Colorado Springs, Colo.
Summer Institute for High School Teachers of Science and Mathematics; 8 weeks; $73,200
Summer Institute for High School Teachers of Science; 8 weeks; $1,000

UNIVERSITY OF COLORADO, Boulder, Colo.; *Summer Institute for High School Teachers of Science;* 6 weeks; $45,100

UNIVERSITY OF CONNECTICUT, Storrs, Conn.; *Summer Institute in Physics for High School Teachers of Physics;* 6 weeks; $65,450

CONVERSE COLLEGE, Spartanburg, S. C.; *Summer Institute for High School Teachers of Biology, Chemistry, and Physics;* 8 weeks; $72,650

CORNELL UNIVERSITY, Ithaca, N. Y.; *Summer Institute in Earth Sciences for High School Teachers of Science;* 6 weeks; $53,250

UNIVERSITY OF DELAWARE, Newark, Del.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $19,600

UNIVERSITY OF DENVER, Denver, Colo.; *Summer Institute for High School Teachers of Science and Mathematics;* 9 weeks; $45,500

DILLARD UNIVERSITY, New Orleans, La.; *Summer Institute for High School Teachers of Science;* 6 weeks; $29,000

DRAKE UNIVERSITY, Des Moines, Iowa; *Summer Institute for High School Teachers of Science;* 6 weeks; $47,100

DUKE UNIVERSITY, Durham, N. C.
Summer Institute for High School Teachers of Science and Mathematics and Elementary School Supervisors; 9 weeks; $97,900
Summer Institute in Radiation Biology for High School Teachers of Science; 8 weeks; $19,000

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $75,800

FORDHAM UNIVERSITY, New York, N. Y.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $47,050

UNIVERSITY OF GEORGIA, Athens, Ga.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $47,700

HARVARD UNIVERSITY, Cambridge, Mass.; *Summer Institute in Nuclear Science and Biology for High School and College Teachers of Science;* 8 weeks; $19,000

UNIVERSITY OF HAWAII, Honolulu, T. H.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $90,850

HOWARD PAYNE COLLEGE, Brownwood, Tex.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $47,550

HOWARD UNIVERSITY, Washington, D. C.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $19,000

UNIVERSITY OF IDAHO, Moscow, Idaho; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $63,050

ILLINOIS WESLEYAN UNIVERSITY, Bloomington, Ill.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $63,700

UNIVERSITY OF ILLINOIS, Urbana, Ill.; *Summer Institute for College Teachers of Geology;* 8 weeks; $37,500

INDIANA UNIVERSITY, Bloomington, Ind.; *Summer Institute for High School Teachers of Biology;* 6 weeks; $33,400

INTERAMERICAN UNIVERSITY OF PUERTO RICO, San German, Puerto Rico; *Summer Institute for High School Teachers of Biology and General Science;* 8 weeks; $57,750

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, Iowa; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $59,200

IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; *Summer Institute for Junior High School Teachers of General Science;* 8 weeks; $63,050

KANSAS STATE TEACHERS COLLEGE, Emporia, Kans.; *Summer Institute for High School Teachers of Science;* 6 weeks; $51,900

UNIVERSITY OF KANSAS, Lawrence, Kans.; *Summer Institute for High School and College Teachers of Mathematics;* 8 weeks; $74,700

LAFAYETTE COLLEGE, Easton, Pa.; *Summer Institute for High School Teachers of Chemistry and Physics;* 6 weeks; $25,100

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; *Summer Institute for High School Teachers of Science and Mathematics;* 9 weeks; $68,300

MARQUETTE UNIVERSITY, Milwaukee, Wisc.; *Summer Institute for High School Teachers of Biology;* 6 weeks; $43,550

UNIVERSITY OF MARYLAND, College Park, Md.; *Summer Institute for High School Teachers of Science;* 6 weeks; $47,650

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.

Summer Institute for High School Science Teachers; 6 weeks; $51,000

Summer Institute for Junior College Teachers of Science and Mathematics; 6 weeks; $51,000

NORTHERN MICHIGAN COLLEGE, Marquette, Mich.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $45,250

WESTERN MICHIGAN COLLEGE, Kalamazoo, Mich.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $48,250

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.

Summer Institute for High School Teachers of Chemistry, Mathematics and Physics; 8 weeks; $34,850

Summer Institute for High School Teachers of Science and Mathematics; 5 weeks; $55,950

Special Summer Institute for High School Physics Teachers in the Program of the Physical Science Study Committee; 8 weeks; $60,300

UNIVERSITY OF MISSISSIPPI, University, Miss.; *Summer Institute for High School Teachers of Science and Mathematics;* 11 weeks; $128,350

UNIVERSITY OF MISSOURI, Columbia, Mo.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $60,000

MONTANA STATE COLLEGE, Bozeman, Mont.; *Summer Institute for High School and College Teachers of Chemistry;* 5 weeks; $41,400

MONTANA STATE UNIVERSITY, Missoula, Mont.; *Summer Institute in Radiation Biology and Biology for High School Teachers of Biology;* 8 weeks; $36,100

MORGAN STATE COLLEGE, Baltimore, Md.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $63,700

MURRAY STATE COLLEGE, Murray, Ky.; *Summer Institute for High School Teachers of Science;* 8 weeks; $75,450

UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; *Summer Institute for High School and Junior High School Teachers of Science and Mathematics;* 8 weeks; $35,600

UNIVERSITY OF NEW HAMPSHIRE, Durham, N. H.; *Summer Institute for High School Teachers of Chemistry and Physics;* 8 weeks; $73,350

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; *Summer Institute for High School Teachers of Science;* 8 weeks; $63,250

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $19,000

NORTH CAROLINA COLLEGE AT DURHAM, Durham, N. C.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $60,300

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $72,200

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $62,300

NORTHEAST MISSOURI STATE TEACHERS COLLEGE, Kirksville, Mo.; *Summer Institute for High School Teachers of General Science;* 10 weeks; $78,700

NORTHWESTERN STATE COLLEGE, Natchitoches, La.; *Summer Institute for High School Teachers of Biology and Chemistry;* 9 weeks; $61,500

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; *Summer Institute for High School Teachers of Mathematics;* 7 weeks; $96,600

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, INC., Oak Ridge, Tenn.

Summer Institute for High School Teachers of Science and Mathematics; 4 weeks; $31,250

Special Summer Institute for High School Teachers in the Program of the Physical Science Study Committee; 8 weeks; $46,700

OBERLIN COLLEGE, Oberlin, Ohio; *Summer Institute for High School Teachers of Mathematics;* 8 weeks; $79,400

OHIO UNIVERSITY, Athens, Ohio; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $60,600

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; *Summer Institute for High School Teachers of Science;* 8 weeks; $54,000

UNIVERSITY OF OKLAHOMA, Norman, Okla.; *Summer Institute for High School Teachers of Science;* 8 weeks; $42,500

OREGON STATE COLLEGE, Corvallis, Oreg.
Summer Institute for College Teachers of Biology; 6 weeks; $48,450
Summer Institute for High School Teachers of Science and Mathematics; 8 weeks; $63,500

UNIVERSITY OF OREGON, Eugene, Oreg.; *Summer Institute for College Teachers of Biology;* 8 weeks; $29,000

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; *Summer Institute for High School Teachers of Science;* 6 weeks; $49,300

PRINCETON UNIVERSITY, Princeton, N. J.; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $7,500

UNIVERSITY OF PUERTO RICO, Rio Piedras, Puerto Rico; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $52,650

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; *Summer Institute in Biology and Radiation Biology for High School Teachers of Science;* 8 weeks; $80,100

RANDOLPH-MACON WOMAN'S COLLEGE, Lynchburg, Va.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $60,450

REED COLLEGE, Portland, Oreg.; *Special Summer Institute for High School Physics Teachers in the Program of the Physical Science Study Committee;* 7 weeks; $47,000

RENSSELAER POLYTECHNIC INSTITUTE, Troy, N. Y.; *Summer Institute for High School Teachers of Science;* 8 weeks; $110,250

RIPON COLLEGE, Ripon, Wisc.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $33,500

RUTGERS, The State University, New Brunswick, N. J.; *Summer Institute for High School Teachers of Mathematics;* 6 weeks; $50,000

ST. LOUIS UNIVERSITY, St. Louis, Mo.; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $27,800

SAN JOSE STATE COLLEGE, San Jose, Calif.; *Summer Institute for High School Teachers of General Science;* 6 weeks; $46,750

SOUTH DAKOTA STATE COLLEGE, Brookings, S. Dak.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $52,750

STATE UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $62,400

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; *Summer Institute for High School Teachers of Chemistry;* 6 weeks; $41,300

SOUTHERN METHODIST UNIVERSITY, Dallas, Tex.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $37,800

STEPHEN F. AUSTIN STATE COLLEGE, Nacogdoches, Tex.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $52,200

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J.; *Summer Institute for High School Teachers of Science;* 6 weeks; $57,050

TENNESSEE POLYTECHNIC INSTITUTE, Cookeville, Tenn.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $69,600

TEXAS SOUTHERN UNIVERSITY, Houston, Tex.; *Summer Institute for High School Teachers of Science and Mathematics;* 12 weeks; $72,600

UNIVERSITY OF TEXAS, Austin, Tex.; *Summer Institute for High School Teachers of Natural Science and Mathematics;* 6 weeks; $48,300

TUFTS UNIVERSITY, Medford, Mass.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $49,650

TUSKEGEE INSTITUTE, Tuskegee Institute, Ala.; *Summer Institute for High School Teachers of Chemistry;* 8 weeks; $54,300

UNION COLLEGE, Schenectady, N. Y.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $50,250

UTAH STATE UNIVERSITY, Logan, Utah; *Summer Institute for High School Teachers of Chemistry, Physics and Mathematics;* 10 weeks; $62,750

UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLLEGE, Burlington, Vt.; *Summer Institute for High School Teachers of Mathematics;* 7 weeks; $57,000

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; *Summer Institute for High School Teachers of Science;* 8 weeks; $61,200

VIRGINIA STATE COLLEGE, Petersburg, Va.; *Summer Institute for High School Teachers of General Science;* 6 weeks; $52,250

STATE COLLEGE OF WASHINGTON, Pullman, Wash.; *Summer Institute for High School Teachers of Science and Mathematics;* 8 weeks; $63,900

WAYNE STATE UNIVERSITY, Detroit, Mich.; *Summer Institute in Radiation Biology for High School Teachers of Science;* 8 weeks; $19,000

WESLEYAN UNIVERSITY, Middletown, Conn.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $38,700

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; *Summer Institute for High School Teachers of Science and Mathematics;* 6 weeks; $47,450

WILLIAMS COLLEGE, Williamstown, Mass.; *Summer Institute for Junior College and College Teachers of Biology;* 6 weeks; $41,600

UNIVERSTY OF WISCONSIN, Madison, Wisc.; *Summer Institute for High School Teachers of Mathematics;* 8 weeks; $72,900

WORCESTER POLYTECHNIC INSTITUTE, Worcester, Mass.; *Summer Institute for High School Teachers of Physics;* 6 weeks; $38,900

UNIVERSITY OF WYOMING, Laramie, Wyo.
Summer Institute in Biology and Radiation Biology for High School Teachers of Biology; 8 weeks; $72,600
Summer Institute for High School Teachers of Mathematics; 8 weeks; $68,100

Other

ALFRED LANDE, Ohio State University, Columbus, Ohio; *A New Approach to the Teaching of Quantum Mechanics;* 4 months; $1,000

AMERICAN ASTRONOMICAL SOCIETY, Pasadena, Calif.
Visiting Astronomers; 1 year; $11,025
Visiting Professors in Astronomy; 1 year; $17,000

AMERICAN CHEMICAL SOCIETY, Washington, D. C.; *Visiting Scientists;* 1 year; $19,550

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.
Experimental TV-Films in Undergraduate Biology; 1 year; $47,800
Visiting Biologists; 1 year; $25,415

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.
Visiting Scientists Program in Physics; 1 year; $28,900
Visiting Scientists to High Schools Program in Physics; 1 year; $24,265

AMERICAN PHYSIOLOGICAL SOCIETY, Washington, D. C.; *Workshop on the Teaching of Undergraduate Physiology;* 10 days; $8,155

AMERICAN SOCIETY OF ZOOLOGISTS, Chicago, Ill.; *A Refresher Course Dealing With Recent Advances in the Biology of Protozoa;* 2 days; $3,500

BRANDEIS UNIVERSITY, Waltham, Mass.; *Brandeis University Institute in Photobiology;* 6 weeks; $8,000

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; *Summer Conference for Teachers of Astronomy;* 6 weeks; $20,700

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; *Pilot Course in Process Instrumentation and Automatic Control for Post-High School Engineering Teachers;* 3 weeks; $12,000

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Summer Workshop for Introducing Qualified Science Students to the Field of Meteorology;* 4 weeks; $14,400

UNIVERSITY OF COLORADO, Boulder, Colo.; *In-Service Program for Elementary School Teachers;* 32 weeks; $1,125

COLUMBIA UNIVERSITY, New York, N. Y.; *Summer Program for Secondary School Science Teachers;* 2 months; $19,550

CRANBROOK INSTITUTE OF SCIENCE, Bloomfield Hills, Mich.; *A Symposium on the Educational Use of Projection Planetaria;* 3 days; $7,000

EDUCATIONAL TESTING SERVICE, Princeton, N. J.; *Horizons of Science;* 6 months; $45,550

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; *Mathematics Summer Camp for High School Students;* 6 weeks; $9,300

GULF COAST RESEARCH LABORATORY, Ocean Springs, Miss.; *Support for Teachers in Biology and Geology;* 8 weeks; $8,000

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; *High School Science Students Institute;* 2 weeks; $6,560

UNIVERSITY OF KANSAS, Lawrence, Kans.; *Science and Mathematics Camp;* 3 weeks; $8,500

UNIVERSITY OF MARYLAND, College Park, Md.; *A Summer Institute on Junior High School Mathematics;* 4 weeks; $20,000

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.
Curriculum Workshop in Electrical Engineering Education; 10 days; $7,500
The Teaching of Physical Science in the Secondary Schools; 1 year; $500,000

MATHEMATICAL ASSOCIATION OF AMERICA, Buffalo, N. Y.
Production of Films for Improving Collegiate Mathematical Instruction; 2 years; $49,000
A Pilot Program of Visiting Lectureships to Secondary Schools; 2 years; $47,700
Program Review and Action Planning Meeting; 6 weeks; $7,500

MEDICAL COLLEGE OF VIRGINIA, Richmond, Va.; *Research Activities and Science Teaching in the Undergraduate Institutions of Virginia;* 2 days; $5,650

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; *Conference on the Teaching of Physics in the High Schools;* 5 days; $5,750

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D. C.
Completion of the Preparation of a Number of Publications for Biologists; 7 months; $16,675
Prototype Poster Exhibit; 6 months; $25,000

NATIONAL BUREAU OF STANDARDS, Washington, D. C.; *Training Program in Numerical Analysis for Senior University Staff;* 4 months; $63,600

NATIONAL SCIENCE TEACHERS ASSOCIATION, Washington, D. C.; *Exploratory Conference on Science in the Elementary School;* 3 days; $4,860

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, INC., Oak Ridge, Tenn.; *Program of Assistance to Science Teaching in Secondary Schools;* 1 year; $116,025

OHIO ACADEMY OF SCIENCE, Akron, Ohio; *A Symposium on Trends in the Teaching of College General Chemistry;* 3 days; $400

OKLAHOMA STATE UNIVERSITY, Stillwater, Okla.; *Symposia in Conjunction With the Southern Regional Graduate Summer Session in Statistics;* 6 weeks; $5,300

UNIVERSITY OF OREGON, Eugene, Oreg.; *Workshop for High School Science and Mathematics Teachers;* 1 year; $2,210

UNIVERSITY OF PUERTO RICO, Rio Piedras, Puerto Rico; *Combined Twelve-Month In-Service and Summer Institute for High School Teachers of Science and Mathematics;* 49 weeks; $72,900

PURDUE UNIVERSITY, Lafayette, Ind.; *Improvement and Analysis of a Master's Program To Prepare Retiring Military Officers To Teach Basic Courses in Mathematics in Colleges and Universities;* 1 year; $7,000

ROCHESTER INSTITUTE OF TECHNOLOGY, Rochester, N. Y.; *Follow-Up Survey of Graduates of Rochester Institute of Technology;* 6 months; $800

UNIVERSITY OF ROCHESTER, Rochester, N. Y.; *A Summer Science Workshop for Elementary School Teachers-Coordinators;* 6 weeks; $45,000

SCIENCE SERVICE, Washington, D. C.; *Science Clubs of America;* 1 year; $25,000

WALDEMAR MEDICAL RESEARCH FOUNDATION, INC., Port Washington, N. Y.; *An Experimental Program To Supplement the Training of High School Students in the Biological Sciences;* 3 months; $7,600

WESLEYAN UNIVERSITY, Middletown, Conn.; *Conference for the Examination of New or Modified Approaches to the Teaching of Chemistry;* 10 days; $15,675

WESTERN SOCIETY OF ENGINEERS, Chicago, Ill.; *National Conference on Problems of Higher Education in Science and Engineering;* 3 days; $6,050

UNIVERSITY OF WISCONSIN, Madison, Wis.; *A Demonstration Class for Eighth Grade Students To Be Held in Connection With the National Science Foundation Summer Institute;* 6 weeks; $500

YALE UNIVERSITY, New Haven, Conn.; *School Mathematics Study Group;* 1 year; $100,000

THE PRESIDENT'S COMMITTEE ON SCIENTISTS AND ENGINEERS

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D. C.; Howard L. Bevis, Chairman; *The President's Committee on Scientists and Engineers;* 11 months; $120,000

POLICY STUDIES

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Survey of Research Potential and Training in the Mathematical Sciences;* 18 months; $2,500

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; *Editing, Printing and Distribution of Six Final Reports and a Summary Report of a Study of Scientific Activities in Six State Governments;* 10 months; $7,000

SCIENTIFIC MANPOWER

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.; *Maintaining the National Register of Scientific and Technical Personnel in the Field of Biology;* 1 year; $34,500

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.; *Maintaining the National Register of Scientific and Technical Personnel in the Fields of Physics and Astronomy;* 9 months; $15,000

AMERICAN PSYCHOLOGICAL ASSOCIATION, Washington, D. C.; *National Register of Scientific and Technical Personnel in Psychology;* 2 years; $6,350

ENGINEERS JOINT COUNCIL, New York, N. Y.; *Maintaining the National Register of Scientific and Technical Personnel in the Field of Engineering;* 1 year; $20,000

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D. C.

Maintaining the National Register of Scientific and Technical Personnel in the Earth Sciences; 1 year; $24,000

Doctorate Survey; 6 months; $6,776

ATTENDANCE AT INTERNATIONAL MEETINGS

Annual Meeting Commission on Education of International Institute of Refrigeration, Paris, France: W. R. WOOLRICH, University of Texas, Austin, Tex.

Australian and New Zealand Association for the Advance of Science Symposium on Wood Anatomy, Adelaide, Australia; F. M. SCOTT, University of California, Los Angeles, Calif.

Commission on Proteins of the International Union of Pure and Applied Chemistry, Vienna, Austria:

H. NEURATH, University of Washington, Seattle, Wash.

J. W. WILLIAMS, University of Wisconsin, Madison, Wis.

Conference on Interactions in Ionic Solutions, Oxford, England:

H. S. FRANK, University of Pittsburgh, Pittsburgh, Pa.

W. R. GILKERSON, University of South Carolina, Columbia, S. C.

H. S. HARNED, Sterling Chemistry Laboratory, New Haven, Conn.

Conference on Magnetism, Grenoble, France: R. M. BOZORTH, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

Conference on Physical Problems of Atomic and Molecular Spectroscopy, Moscow, Russia: G. H. DIEKE, Johns Hopkins University, Baltimore, Md.

Configurations and Interactions of Macromolecules and Liquid Crystals, London, England: S. A. RICE, University of Chicago, Chicago, Ill.

Cryogenic Physics Meeting of International Institute of Refrigeration, Delft, Netherlands: F. G. BRICKWEDDE, Pennsylvania State University, University Park, Pa.

Eighth Annual International Conference on High Energy Physics, Geneva, Switzerland:

R. P. FEYNMEN, California Institute of Technology, Pasadena, Calif.

A. KLEIN, University of Pennsylvania, Philadelphia, Pa.

J. SCHWINGER, Harvard University, Cambridge, Mass.

C. N. YANG, Institute for Advanced Study, Princeton, N. J.

Enzyme Commission of the International Union of Biochemistry, Vienna, Austria: A. L. LEHNINGER, Johns Hopkins School of Medicine, Baltimore, Md.

Fifteenth International Zoological Congress, London, England; E. G. BUTLER, Princeton, University, Princeton, N. J.

Fifth Congress of the International Association of Quaternary Research, Madrid-Barcelona, Spain:

C. EMILIANI, University of Miami, Coral Gables, Fla.

J. B. GRIFFIN, University of Michigan, Ann Arbor, Mich.

E. B. LEOPOLD, U. S. Geological Survey, Denver, Colo.

H. E. WRIGHT, Jr., University of Minnesota, Minneapolis, Minn.

First International Conference for Insect Pathology and Biological Control, Prague, Czechoslovakia: E. A. STEINHAUS, University of California, Berkeley, Calif.

First International Congress of the Society of Bioclimatology and Biometeorology, Vienna, Austria:

N. L. MINTZ, Brandeis University, Waltham, Mass.

T. L. NOFFSINGER, Purdue University, Lafayette, Ind.

R. B. PLATT, Emory University, Emory University, Ga.

Fourth International Conference on Soil Mechanics and Foundation Engineering, London, England:

A. R. JUMIKIS, Rutgers. The State University, New Brunswick, N. J.

G. A. LEONARDS, Purdue University, Lafayette, Ind.

R. B. PECK, University of Illinois, Urbana, Ill.

Fourth International Congress of Biochemistry, Vienna, Austria: AMERICAN CHEMICAL SOCIETY, Philadelphia, Pa. (American Biochemists)

Fourth International Ethological Conference, Freiburg, Germany:

F. A. BEACH, Yale University, New Haven, Conn.

K. D. ROEDER, Tufts University, Medford, Mass.

General Assembly of the International Union of Pure and Applied Physics, Rome Italy.

R. H. BOLT, Massachusetts Institute of Technology, Cambridge, Mass.

R. B. BRODE, University of California, Berkeley, Calif.

H. H. NIELSEN, Ohio State University, Columbus, Ohio.

J. H. VAN VLECK, Harvard University, Cambridge, Mass.

International Association of Limnology, Venice, Italy: J. HEDGPETH, College of the Pacific, Marin County, Calif.

International Commission for the Nomenclature of Cultivated Plants, London, England: M. G. WEISS, U. S. Department of Agriculture, Beltsville, Md.

International Conference on Coordination Compounds, Rome, Italy:

J. C. BAILAR, JR., University of Illinois, Urbana, Ill.

F. BASOLO, Northwestern University, Evanston, Ill.

International Conference on Elementary Particles, Padua, Italy:

J. ASHKIN, Carnegie Institute of Technology, Pittsburgh, Pa.

H. PRIMAKOFF, Washington University, St. Louis, Mo.

International Conference of the International Pharmaceutical Federation, Brussels, Belgium: SPECIAL LIBRARIES ASSOCIATION, Squibb Institute for Medical Research, New Brunswick, N. J.

International Conference on Nuclear Structure, Rehovoth, Israel: L. WILETS, Los Alamos Scientific Labortary, Los Alamos, N. Mex.

International Congress of Mathematicians, Edinburgh, Scotland:

A. A. ALBERT, University of Chicago, Chicago, Ill.

R. D. ANDERSON, Louisiana State University and Agricultural and Mechanical College, Baton, Rouge, La.

R. H. BING, Institute for Advanced Study, Princeton, N. J.

R. BOTT, University of Michigan, Ann Arbor, Mich.

R. H. BRUCK, University of Wisconsin, Madison, Wis.

S. CHERN, University of Chicago, Chicago, Ill.

K. L. CHUNG, Syracuse University, Syracuse, N. Y.

A. CHURCH, Princeton University, Princeton, N. J.

H. F. FEHR, Columbia University, New York, N. Y.

S. H. GOULD, American Mathematical Society, Providence, R. I.

J. G. KEMENY, Hanover, N. H.

S. C. KLEENE, University of Wisconsin, Madison, Wis.

D. H. LEHMER, University of California, Berkeley, Calif.

T. MATSUSKA, Northwestern University, Evanston, Ill.

J. W. MILNER, Mathematical Institute, Oxford, England.

E. E. MOISE, University of Michigan, Ann Arbor, Mich.

M. NAGATA, Harvard University, Cambridge, Mass.

J. NASH, Massachusetts Institute of Technology, Cambridge, Mass.

C. L. PERRY, Stanford Research Institute, Menlo Park, Calif.

W. RUDIN, University of Rochester, Rochester, N. Y.

M. M. SCHIFFER, University of Amsterdam, Amsterdam, Holland.

E. H. SPANIER, University of Chicago, Chicago, Ill.

A. TARSKI, University of California, Berkeley, Calif.

W. J. TRJITZNSKY, University of Illinois, Urbana, Ill.

H. C. WANG, Northwestern University, Evanston, Ill.

J. WOLFOWITZ, Cornell University, Ithaca, N. Y.

O. ZABRISKI, Harvard University, Cambridge, Mass.

International Federation of Electron Microscope Societies, Berlin, Germany:

T. F. ANDERSON, Maloney Clinic, Philadelphia, Pa.

C. MORGAN, Columbia University, New York, N. Y.

E. MUELLER, Pennsylvania State University, University Park, Pa.

K. R. PORTER, The Rockefeller Institute, New York, N.Y.

F. O. SCHMITT, Massachusetts Institute of Technology, Cambridge, Mass.

H. SWIFT, University of Chicago, Chicago, Ill.

J. H. L. WATSON, Edsel B. Ford Institute for Medical Research, Henry Ford Hospital, Detroit, Mich.

International Geographical Union Regional Conference, Tokyo, Japan:

W. G. MCINTIRE, Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La.

G. B. CRESSEY, Syracuse University, Syracuse, N. Y.

International Institute of Refrigeration, Moscow, Russia: C. F. KAYAN, Columbia University, New York, N. Y.

International Institute of Welding, Vienna, Austria: R. D. STOUT, Lehigh University, Bethlehem, Pa.

International Symposium on Atmospheric Diffusion and Air Pollution, Oxford England:

H. E. CRAMER, Massachusetts Institute of Technology, Round Hill Field Station, South Dartmouth, Mass.

A. J. HAAGEN-SMIT, California Institute of Technology, Pasadena, Calif.

International Symposium on Macromolecular Chemistry, Prague, Czechoslovakia:

H. MORAWETZ, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

R. SIMHA, New York University, New York, N. Y.

R. S. STEIN, University of Massachusetts, Amherst, Mass.

International Symposium on Passivity, Darmstadt, Germany:

N. HACKERMAN, University of Texas, Austin, Tex.

H. H. UHLIG, Massachusetts Institute of Technology, Cambridge, Mass.

Kamerlingh Onnes Conference in Low Temperature Physics, Leiden, Netherlands:

R. M. BOZORTH, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

F. G. BRICKWEDDE, Pennsylvania State University, University Park, Pa.

L. N. COOPER, Ohio State University, Columbus, Ohio.

R. P. FEYNMEN, California Institute of Technology, Pasadena, Calif.

E. F. HAMMEL, Jr., Los Alamos Scientific Laboratory, Los Alamos, N. Mex.

Meeting of Commission on National Atlases of the International Geographical Union, Moscow, Russia: C. P. BARNES, U. S. Department of Agriculture, Washington, D. C.

Meeting of Joint Commission on Spectroscopy, Moscow, Russia: R. S. MULLIKIN, University of Chicago, Chicago, Ill.

Ninth International Astronautical Congress, Amsterdam, Holland: A. MIELE, Purdue University, Lafayette, Ind.

Ninth Pacific Science Congress, Bangkok, Thailand:

T. P. BANK, II, University of Michigan, Ann Arbor, Mich.

M. R. BRITTAN, Sacramento State College, Sacramento, Calif.

F. E. EGLER, Aton Forest, Norfolk, Conn.

G. W. GRACE, Yale University, New Haven, Conn.

J. H. JOHNSON, Colorado School of Mines, Golden, Colo.

H. POPENOE, University of Florida, Gainesville, Fla.

P. C. SILVA, University of Illinois, Urbana, Ill.

H. S. SWINGLE, Alabama Polytechnic Institute, Auburn, Ala.

I. B. TAEUBER, Hyattsville, Md.

Occipital Lobe Function, Freiburg, Germany: H. TEUBER, New York University of Medicine, New York, N. Y.

Seventh International Congress of Microbiology, Stockholm, Sweden: AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C. (partial support of 16–20 American microbiologists).

Sixth International Conference on Low Temperature Physics, Leiden, Netherlands: C. F. SQUIRE, Rice Institute, Houston, Tex.

Solvay Conference, Brussels, Belgium:

A. R. SANDAGE, Carnegie Institution of Washington, Pasadena, Calif.

H. SHAPLEY, Harvard University, Cambridge, Mass.

Special Session of the International Statistical Institute, Brussels, Belgium:

G. M. COX, North Carolina State College of Agriculture and Engineering, Raleigh, N. C.

B. B. DAY, Washington, D. C.

Summer School on Information Theory, Varenna, Italy:

J. W. LEE, Massachusetts Institute of Technology, Cambridge, Mass.

E. B. NEWMAN, Harvard University, Cambridge, Mass.

Symposium on Microchemistry, Birmingham, England:

A. A. BENEDETTI-PICHLER, Queens College, Flushing, N. Y.

F. J. WELCHER, Indiana University, Bloomington, Ind.

P. W. WEST, Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La.

Symposium on Rarefied Gas Dynamics, Nice, France: M. Z. v. KRZYWOBLOCKI, University of Illinois, Urbana, Ill.

Symposium on the Utilization of Nitrogen and its Compounds by Plants, Reading, England:

F. C. STEWARD, Cornell University, Ithaca, N. Y.

G. C. WEBSTER, Ohio State University, Columbus, Ohio.

Tenth Assembly of the International Astronomical Union, Moscow, Russia:

L. H. ALLER, University of Michigan, Ann Arbor, Mich.

E. F. CARPENTER, University of Arizona, Tucson, Ariz.

T. GOLD, Harvard College Observatory, Cambridge, Mass.

G. E. KRON, University of California, Mt. Hamilton, Calif.

G. P. KUIPER, Yerkes Observatory, Williams Bay, Wis.

D. LAYZER, Harvard College Observatory, Cambridge, Mass.

J. NEYMAN, Statistical Laboratory, Cambridge, England.

E. K. RABE, Cincinnati Observatory, Cincinnati, Ohio.

W. O. ROBERTS, University of Colorado, Boulder, Colo.

M. SCHWARZSCHILD, Princeton University Observatory, Princeton, N. J.

C. K. SEYFERT, Vanderbilt University, Nashville, Tenn.

P. VAN DE KAMP, Swarthmore College, Swarthmore, Pa.

Third International Congress on Prestressing, Berlin, Germany: T. Y. LIN, University of California, Berkeley, Calif.

Thirtieth Session of the International Statistical Institute, Stockholm, Sweden:

J. CORNFIELD, National Institutes of Health, Bethesda, Md.:

J. H. CUMBERLAND, University of Maryland, College Park, Md.

E. LUKACS, Catholic University of America, Washington, D. C.

Thirty-Third International Congress of Americanists, San Jose, Costa Rica:

M. S. EDMONDSON, Tulane University of Louisiana, New Orleans, La.

D. W. LATHRAP, Harvard University, Cambridge, Mass.

E. B. RICKETSON, Tulane University of Louisiana, New Orleans, La.

P. B. TAYLOR, JR., Tulane University of Louisiana, New Orleans, La.

Twelfth Annual Congress of the International Science Film Association, Moscow, Russia: R. H. WHALEY, National Academy of Sciences—National Research Council, Washington, D. C.

Twelfth International Ornithological Congress, Helsinki, Finland:

P. H. BALDWIN, Colorado State University, Fort Collins, Colo.

D. S. FARNER, State College of Washington, Pullman, Wash.

M. H. MOYNIHAN, Smithsonian Institution, Washington, D. C.

R. S. PALMER, New York State Museum and Science Service, Albany, N. Y.

C. G. SIBLEY, Cornell University, Ithaca, N. Y.

A. WOLFSON, Northwestern University, Evanston, Ill.

Twenty-Third Annual Conference of the International Federation for Documentation, Paris, France: H. H. HENKLE, John Crerar Library, Chicago, Ill.

Visit to the Institute of Ophthalmology in London, England: R. G. JAMES, State University of Iowa, Iowa City, Iowa.

Visit to the Soviet Academy of Construction and Architecture; Research Laboratories; Moscow State University, Moscow, Russia: B. BRESLER, University of California, Berkeley, Calif.

Visit to Two Scientific Meetings in Europe, and a Report on Public Information Procedures: S. S. NEGUS, Medical College of Virginia, Richmond, Va.

SCIENTIFIC INFORMATION EXCHANGE

GILBERT W. KING, International Business Machines Corporation, Yorktown Heights, N. Y.; *Visits to the Cambridge Language Research Unit at Cambridge, England, and Other Centers of Research in Information Retrieval in London and Paris (Beginning February 9, 1958)*; 2 weeks; $770

HERBERT B. WEAVER, University of Hawaii, Honolulu, T. H.; *Travel and Subsistence Expenses in Connection With Visits to Psychological Laboratories and Research Facilities;* 5 months; $1,700

ACTA METALLURGICA, Schenectady, N. Y.; *English Editions of Two Russian Journals:* The Physics of Metals and Metallography *and* The Journal of Abstracts—Metallurgy; 1 year; $23,710

UNIVERSITY OF ALASKA, College, Alaska; *Traveling and Subsistence Expenses in Connection With Visits to Biological Laboratories and Research Facilities of the University of Alaska;* 3 months; $2,500

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D. C.; *Participation and Administration of the National Science Foundation Colloquia Series;* 2 years; $4,000

AMERICAN ASTRONOMICAL SOCIETY, Pasadena, Calif.

Publication of the Astronomical Journal; 3 years; $15,000

Supplements to the Astrophysical Journal; 3 years; $7,500

AMERICAN CERAMIC SOCIETY, Columbus, Ohio; *Translation and Publication of the Proceedings of the Symposium on the Structure of Glass Held in Leningrad, November 23–27, 1953;* 1 year; $7,000

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D. C.

An English Edition of the Russian Journal Soil Science; 1 year; $36,575

An English Edition of the Russian Proceedings of the Academy of Sciences of the USSR—Biochemistry Section; 1 year; $15,050

English Editions of Three Russian Journals: Microbiology, Plant Physiology, *and* Doklady (*Biological Sciences and Botanical Science Sections*); 1 year; $13,170

Information on Biological Research and Publications in the USSR; 1 month; $9,175

Preparation of a Supplement to the Bibliography of Eastern Asiatic Botany, *by E. D. Merrill and E. H. Walker;* 1 year; $28,266

Publication of an English Translation Manuscript of a Russian Monograph, X-rays and Plants, *by L. P. Breslavets;* 6 months; $7,370

Publication of an English Translation Manuscript of Arachnida, Vol. IV, No. 2, Fauna of the USSR, *by B. I. Pomerantzev;* 6 months; $10,300

Publication of an English Translation Manuscript of Arachnoidea, Vol. VI, No. 1, Fauna of the USSR; 6 months; $7,230

Style Manual for Biological Journals; 2 years; $11,500

The Translation and Publication of a Russian Monograph, Problems in the Classification of Antagonists of Actionmycetes, *by G. F. Gause;* 6 months; $6,320

AMERICAN INSTITUTE OF PHYSICS, New York, N. Y.

The Journal of Chemical Physics; 1 year; $35,000

English Editions of the Russian Publications: Journal of Technical Physics, Doklady (Physics Section) *and* Journal of Acoustics; 1 year; $37,500

An English Edition of the Russian Journal Crystallography; 1 year; $19,000

An English Edition of the Russian Astronomical Journal; 6 months; $19,900

Study of the Physics Publishing Problem; 18 months; $29,700

AMERICAN MATHEMATICAL SOCIETY, Providence, R. I.

For Preparing and Distributing Selected Translations of Russian Mathematics Articles; 1 year; $24,587

Mathematical Reviews; 2 years; $40,000

Preparation of a 15-Year Cumulative Index to Mathematical Reviews; 6 months; $6,600

AMERICAN PHYSICAL SOCIETY, Charlottesville, Va.; *Establish an Experimental Type of Journal for Rapid Publication of Physics Research;* 6 months; $21,000

AMERICAN PHYTOPATHOLOGICAL SOCIETY, Bloomington, Ind.; *50th Anniversary Volume of Reviews of Phytopathology;* 2 years; $22,250

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, N. Y.; *Translation and Publication of the Russian* Journal of Applied Mathematics and Mechanics; 1 year; $35,000

AMERICAN SOCIETY OF PARASITOLOGISTS, Galesburg, Ill.; *Cumulative Index to Volumes 26–40 of* The Journal of Parasitology; 18 months; $3,410

ASTRONOMICAL LEAGUE, Washington, D. C.; *Proceedings of the 1956 General Convention of the Astronomical League;* $300

BIOLOGICAL ABSTRACTS, Philadelphia, Pa.; *The Coverage of the Botanical Literature by Abstracting and Indexing Services;* 4 months; $2,550

BROOKLYN COLLEGE, Brooklyn, N. Y.; *Sociological Abstracts;* 1 year; $5,000

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.
Preparation of an Index Catalogue of Double Stars; 1 year; $6,200
World Bibliography of Fossil Vertebrates and Paleolithic Anthropology, Volume 6; 2 years; $5,900

CAMBRIDGE LANGUAGE RESEARCH UNIT TRUST, Cambridge, England; *Research on New Logico-Mathematical Methods for the Analysis of Languages for Machine Translation;* 1 year; $33,000

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; *Operations Research in the Area of Scientific Communication;* 1 year; $24,100

UNIVERSITY OF CHICAGO, Chicago, Ill.; *Translation of the Economic Atlas of Japan;* 1 year; $7,000

DEPAUW UNIVERSITY, Greencastle, Ind.; *Publication of a Monograph of the Fontinalaceae;* 3 years; $3,700

GEOCHEMICAL SOCIETY, Madison, Wis.; *An English Edition of the Russian Journal* Geochemistry; 1 year; $15,000

GEOCHEMICAL SOCIETY, Washington, D. C.; *Translation and Publication of Two Russian Books in Geochemistry:* Physico-Chemical Principles of Paragenesis of Minerals, *by D. S. Korzhinsky, and* The Geochemistry of Rare and Dispersed Elements in Soils, *by A. P. Vinogradov;* 1 year; $10,780

GEORGE WASHINGTON UNIVERSITY, Washington, D. C.; *New Coordinate Indexing Method of Bound Book Form Bibliographies;* 1 year; $14,000

GEORGETOWN UNIVERSITY, Washington, D. C.; *Mechanical Translation;* 1 year; $186,600

HARVARD UNIVERSITY, Cambridge, Mass.
Research on Automatic Translation of Russian into English; 6 months; $29,150
Research on Automatic Translation of Russian Into English; 4 months; $26,200
Processing of Ethnographic Film Data; 2 years; $19,500

INSTRUMENT SOCIETY OF AMERICA, Pittsburgh, Pa.; *English Editions of Three Russian Journals:* Instruments and Experimental Techniques, Measurement Techniques, *and* Factory Laboratory; 1 year; $93,500

INTERNATIONAL ASSOCIATION FOR PLANT TAXONOMY, Cambridge Mass.; *Revision of List of Nomina Conservanda in the International Code of Botanical Nomenclature;* 1 year; $1,300

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, London, England; *International Abstracting Board;* 1 year; $7,250

INTERNATIONAL GEOGRAPHICAL UNION, Washington, D. C.; *Geographical Conversion Tables;* 1 year; $6,100

JOSIAH MACY, JR., FOUNDATION, New York, N. Y.; *First Conference on the Central Nervous Systems and Behavior;* 1 year; $15,000

LIBRARY OF CONGRESS, Washington, D. C.
Publication of a Selected Bibliography of Japanese Serial Publications in Science and Technology; 6 months; $2,200
A Subject Index to the ASTIA Title Announcement Bulletin; 6 months; $4,000
Compilation of an Accessions List of Scientific and Technical Serials of the Library of Congress; 1 years; $5,000
Reference Center for Reports on Government-Supported Scientific Research; 1 year; $29,600
Continuation of Preparation of a Bibliography on the International Geophysical Year, and Preparation of Index Entries for an Experimental Printed Coordinate Index to the Bibliography; 1 year; $14,000

LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, N. Y.; *The Mutants of Drosophila Melanogaster;* 2 years; $11,300

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.
Information on Scientific and Engineering Publications in the USSR; 8 weeks; $6,030
English Editions of Three Russian Journals: Radio Engineering, Radio Engineering and Electronics, *and* Electro-Communications; 1 year; $70,000
Methods of Translating Languages by Machine; 1 year; $41,400

MATHEMATICAL ASSOCIATION OF AMERICA, Buffalo, N. Y.; *Preliminary Study of Non-Teaching Mathematical Employment;* 4 months; $8,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; *Manual of the Marine Algae of Tropical Eastern America;* 2 years; $14,000

MIDWEST INTER-LIBRARY CENTER, Chicago, Ill.; *Scientific Journals Center;* 1 year; $22,970

MINERALOGICAL SOCIETY OF AMERICA, Chicago, Ill.; *Index to Volumes 31–40 of* The American Mineralogist; 1 year; $4,500

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D. C.
An English Edition of the Russian Abstract Journal: Geology Series; 1 year; $35,770
A Survey of Interest in and Feasibility of an International Journal of Geological Abstracts; 1 year; $7,500
Publication of Proceedings of the Fifth National Clay Minerals Conference; 1 year; $5,000
Planning for an International Conference on Scientific Information; 1 year; $24,000
Publication of an International Geology Review; 1 year; $53,545
Revision of Study on Soviet Professional Manpower in Soviet Satellites; 15 months; $28,000
The Biology Code and Key and an Analytical History of the Chemical-Biological Coordination Center; 6 months; $5,000
The Office of Critical Tables; 1 year; $48,600
Translation and Publication of Two Russian Books in the Field of Geology: Facies Studies, *by D. V. Nalivkin, and* Fundamental Problems in Tectonics, *by V. V. Belousov;* 1 year; $41,460

ORGANIC ELECTRONIC SPECTRAL DATA, INC., Silver Spring, Md.; *Organic Electronic Spectral Data, 1946–1955;* 1 year; $11,750

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; *Investigation of Linguistic Transformations for Information Retrieval;* 16 months; $42,300

PRINCETON UNIVERSITY PRESS, Princeton, N. J.

Some Problems of Chemical Kinetics and Reactivity; 1 year; $1,500

The Translation From the Russian of the Book Entitled The Problem of Stability of Nonlinear Control Systems, *by Academician A. M. Letov;* 6 months; $2,000

RESEARCH INSTITUTE OF TEMPLE UNIVERSITY, Philadelphia, Pa.; *Basic Research Needs in High Temperature Science;* 6 months; $10,000

ROBERT S. PEABODY FOUNDATION FOR ARCHAEOLOGY, Andover, Mass.; *Radiocarbon Samples and Their Dates;* 18 months; $5,000

ROSCOE B. JACKSON MEMORIAL LABORATORY, Bar Harbor, Maine; *Subject-Strain and Gene Bibliography;* 1 year; $5,600

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; *Survey of Scientific Documentation Training Facilities;* 6 months; $750

SMITHSONIAN INSTITUTION, Washington, D. C.

Biological Sciences Information Exchange; 1 year; $25,000

Biological Sciences Information Exchange; 1 year; $28,000

TULANE UNIVERSITY, New Orleans, La.; *Preparation of Handbook of Middle American Indians;* 4 years; $140,700

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS, Philadelphia, Pa.; *An English Edition of the Russian Journal* Theory of Probability and Its Applications; 18 months; $72,240

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; *Test Program To Evaluate Notation Systems for Chemical Structural Formulas;* 1 year; $27,600

APPENDIX E

Grants for the International Geophysical Year Program
Fiscal Year 1958

AURORA AND AIRGLOW

AIR FORCE CAMBRIDGE RESEARCH CENTER:
- Procurement of Miscellaneous Supplies — $3,750
- Operations at Sacramento Peak and Tonanzintla — 1,000

UNIVERSITY OF ALASKA:
- Operational Cost of Auroral Observations and Measurements — 123,100
- Operational Cost for Radio Wave Absorption and Cosmic Noise Method — 22,500

ARCTIC INSTITUTE OF NORTH AMERICA:
- Operational Cost of the Auroral Program in the Antarctic — 55,250

CORNELL UNIVERSITY:
- Headquarters for All-Sky Cameras in the United States — 11,000
- Radar Observations at Ithaca — 4,000
- All-Sky Camera Operations of Six U. S. Stations — 6,900
- The Preparation and Processing of Auroral Data — 32,000

NATIONAL BUREAU OF STANDARDS:
- Airglow Data Reduction — 30,000
- Operational Costs and Coordination of Northern Stations — 23,414

STANFORD UNIVERSITY:
- Operations of Western United States Radar Stations — 10,300
- Development of Equipment for Meteor Observations in the Antarctic — 1,100
- Operation Cost for Radio Absorption and Cosmic Noise Method in Western United States — 11,500

COSMIC RAYS

CALIFORNIA INSTITUTE OF TECHNOLOGY:
- Balloon Flights to be made in the Antarctic — 7,600

UNIVERSITY OF CALIFORNIA:
- Construction of Air Shower Detectors — 2,300
- Procurement and Modification of Neutron Counters and Associated Equipment — 28,850

CARNEGIE INSTITUTION OF WASHINGTON:
- Reduction of Cosmic Ray Ionization Chamber Data — 12,000

UNIVERSITY OF CHICAGO:
- High Altitude Measurements of Cosmic Rays — 8,706
- Study of the Isotopic Constitution of Cosmic Radiation at Balloon Altitudes — 8,175

FRANKLIN INSTITUTE:
- Correlation of Solar Activity with High Altitude Primary Cosmic Ray Intensity — 20,140
- Construction of a Neutron Monitor—Shipboard — 1,720
- Construction and Operation of a Neutron Monitor, Thule, Greenland — 2,940

STATE UNIVERSITY OF IOWA:
- High Altitude Cosmic Ray Measurements in the Arctic — 37,663

UNIVERSITY OF MARYLAND:
- Study of High Speed Cosmic Ray Fluctuations — 16,700
- Reduction of Cosmic Ray Counter Data — 10,000

UNIVERSITY OF MINNESOTA:
- Monitoring Cosmic Ray Intensities at High Altitude — 25,000
- Trajectory Computation and Study — 2,800

UNIVERSITY OF MISSOURI:
- Measurements of Zenith-Angle Dependence of High Energy Musons — 2,600

UNIVERSITY OF NEBRASKA:
- Construction of Two, Triple Coincidence Geiger Counter Telescopes — 12,835
- Construction of a Neutron Monitor — 8,520

UNIVERSITY OF NEW HAMPSHIRE:
- Reduction and Study of Neutron Intensity Time-Variations — 5,229

UNIVERSITY OF NEW MEXICO:
- Investigation of the Semi-Diurnal Planetary Variation of Atmospheric Pressure — 1,800

NEW YORK UNIVERSITY:
- Construction of a Neutron Monitor to be used in Alaska — 15,600
- Studies of the Primary Cosmic Ray Spectrum — 14,200
- Construction of Equipment for Measurement of Neutrons of Solar Origin at High Altitudes — 15,200

SOUTHERN ILLINOIS UNIVERSITY:
- Emulsion Studies — 2,000

GEOMAGNETISM

UNIVERSITY OF CALIFORNIA:
- Operation of Jarvis and Palmyra Magnetic Stations — 22,500

CARNEGIE INSTITUTION OF WASHINGTON:	
Operation of South American Five-Station Network	21,000
U. S. COAST AND GEODETIC SURVEY:	
Expenses of Coordinating and Administering the Geomagnetism Program	45,200
Operation of Magnetic Observatories at Three Antarctic Stations	7,000
Procurement of Equipment and Supplies for Magnetic Stations—Western Pacific	16,000
Operation of East-West U. S. Network	14,185
Operation of North-South Chain Magnetic Stations in Alaska	6,600
Magnetic Gradient Study in Alaska	20,000
Operation of Rapid-Run Auxiliary Magnetographs	16,600
Observations at Knox Coast Station in the Antarctic	3,000

GLACIOLOGY

AMERICAN GEOGRAPHICAL SOCIETY:	
Glacier Observations in Southern Alaska	6,400
ARCTIC INSTITUTE OF NORTH AMERICA:	
Procurement of Glaciological Equipment	36,750
Recruitment, Hiring and Travel of Scientists in the Antarctic	99,365
Establishment and Operation of the Headquarters Unit to Coordinate the Glaciology Program	11,000
Procurement of Equipment for use on Mt. Michelson	25,500
Study of Antarctic Glacial Geology	8,900
Logistic Equipment and Supplies	5,000
DEPARTMENT OF THE ARMY:	
Procurement of Deep Drilling Equipment and Supplies for Antarctica	17,000
CALIFORNIA INSTITUTE OF TECHNOLOGY:	
Glacier Dynamics on Blue Glacier Olympic Mountains	5,000
Antarctic Ice Sampling—Isotope Ratios	10,150
OHIO STATE UNIVERSITY:	
Antarctic Data Reduction and Publication	76,755
UNIVERSITY OF WASHINGTON:	
Meteorological Studies in Western United States (Blue Glacier)	13,500
UNIVERSITY OF WISCONSIN:	
Procurement of Antarctic Portable Gravimeter	5,000

GRAVITY MEASUREMENTS

ARCTIC INSTITUTE OF NORTH AMERICA:	
Recruitment, Hiring and Travel of Scientists for Antarctic	19,000
UNIVERSITY OF CALIFORNIA:	
Observation of Mean Rigidity of the Earth	21,250
COLUMBIA UNIVERSITY:	
Procurement and Construction of Pendulum Equipment for Submarine Pendulum	49,690
Reduction of Gravity Measurements	9,800
UNIVERSITY OF WISCONSIN:	
Procurement of a Gravimeter for Measurements in the Antarctic	6,550
Antarctic Data Reduction and Publication	21,760
Gravimeter Measurements	22,000
WOODS HOLE OCEANOGRAPHIC INSTITUTION:	
Pendulum Gravity Surveys in Australia and New Zealand	12,500

IONOSPHERIC PHYSICS

UNIVERSITY OF ALASKA:	
Ionospheric Absorption—Cosmic Noise Method in Alaska	7,700
Operation of an Atmospheric Whistler Station in Alaska	18,000
Fixed Frequency Backscatter in Alaska	8,450
AMERICAN RADIO RELAY LEAGUE:	
Amateur Participation in Ionospheric Physics	9,455
DARTMOUTH COLLEGE:	
Establishing the Latitude Dependence and Occurrence at Conjugate Geomagnetic Locations of Whistlers in the East	48,800
Ionospheric Absorption, Cosmic Noise Method in the East	2,900
NATIONAL BUREAU OF STANDARDS:	
Operation of Six Antarctic Stations	176,900
Ionospheric Quality Control and Training	36,300
Equatorial VHF Ionospheric Forward Scatter Measurements	39,500
Procurement of Three Atmospheric Radio Noise Recorders	8,900
Fixed Frequency Backscatter Measurements	10,200
VHF Oblique-Incidence Sporadic-E Fired Strength Measurements	22,500
Ionospheric Physics Data Processing	63,285
OFFICE OF NAVAL RESEARCH:	
Ionospheric Absorption, Cosmic Noise Method in Alaska	8,393
PENNSYLVANIA STATE UNIVERSITY:	
Ionospheric Absorption—Pulse Method	3,800
True Height Determination	47,753
STANFORD UNIVERSITY:	
Logistic Support in the Atmospheric Whistler Program	35,907
Fixed Frequency Backscatter Measurements	45,300
UNIVERSITY OF VIRGINIA:	
Procurement, Construction, and Testing of Radio Astronomy Equipment	6,900

LONGITUDE AND LATITUDE

U. S. Coast and Geodetic Survey:
- Longitude and Latitude Measurements in Alaska — 5,000

METEOROLOGY

U. S. Weather Bureau:
- Data Reduction and Publication — 19,650
- Procurement of Equipment and Supplies in Antarctica — 98,010
- South American Upper-Air Meteorological Observations — 43,500
- Operation at the Antarctic Weather Central — 36,700
- Arctic Ice Floe Meteorological Stations — 81,500
- Antarctic Geochemical Measurements of Carbon Dioxide and Surface Ozone — 20,000
- Reduction and Preparation for Publication Meteorological Data — 14,670

OCEANOGRAPHY

University of California:
- Procurement of Equipment for use in the Island Observatories Program — 25,005
- Related Expense for Deep Current Program in the Pacific — 16,000
- Procurement of Equipment for Radio-Chemistry Analysis — 27,000

Columbia University:
- Operations of Island Observatories in the Atlantic — 31,400
- Operational Costs of Deep Current Oceanography Program in the Atlantic — 87,075
- Operational Costs for Radiochemistry Analysis — 20,000

U. S. Department of the Navy:
- Procurement of Bathythermographs for Deep Current Program — 421
- Reduction of Bathythermographic Data — 30,000

Texas Agricultural and Mechanical College System:
- Operational Cost of Deep Current Oceanography Program in the Atlantic — 2,000
- Radiochemistry Analysis of Sea Water in the Atlantic and Gulf of Mexico — 14,000

University of Washington:
- Operation of the Deep Current Oceanography Program in the Pacific — 28,058
- Procurement of Carbon Dioxide Measuring Equipment — 13,042
- Arctic Sea Ice Studies — 4,325

Woods Hole Oceanographic Institution:
- Operational Costs and Related Expenses in the Deep Current Oceanography Program in the Atlantic — 29,450
- Radiochemistry Analysis of Sea Water — 16,250
- Operational Costs of Oceanography Program in the Arctic — 4,000

ROCKETRY

U. S. Department of the Army:
- Procurement of Rockets and Equipment and Partial Operational Costs on Guam — 40,000

State University of Iowa:
- Planning and Operation in Connection with Rocketry Program in the Arctic — 33,300

Office of Naval Research:
- Pacific Solar Eclipse Expedition — 50,000

SEISMOLOGY

Arctic Institute of North America:
- Seismology Personnel in the Antarctic — 47,000

California Institute of Technology:
- Procurement of Strain Seismographs for the Study of Crustal Strain Accumulation — 3,600
- Procurement of Equipment for use in the Antarctic — 3,000

Carnegie Institution of Washington:
- Seismic Exploration of Continental Structure — 6,000

U. S. Coast and Geodetic Survey:
- Seismography Measurements on the Pacific Islands — 7,800
- Antarctic Teleseismic Measurements — 13,000

Columbia University:
- Procurement of Equipment for use in the Antarctic — 3,000
- Seismic Measurements in the Atlantic — 5,500
- Operational Costs for Long Period Wave Studies — 4,200
- Data Reduction and Publication — 9,220

University of Wisconsin:
- Antarctic Data Reduction and Publication — 47,255
- Seismic Exploration of Coastal Areas — 31,900

SOLAR ACTIVITY

Cornell University:
- A Solar Radio Noise Patrol — 7,565

High Altitude Observatory:
- Development of Three Indirect Flame Recorders — 2,738
- Visual Observations — 6,000
- Rapid Data Presentation — 3,200

University of Michigan:
- High Resolution Profiles of H-alpha in Solar Flames — 6,250
- Operational Costs of McMath-Hulbert Observatory — 6,250

National Bureau of Standards:
- Data Reduction and Publication — 13,000

WORLD DAYS

National Bureau of Standards:
- Operation of U. S. and World Warning Center — 27,340

GENERAL RELATED SCIENTIFIC SUPPORT	
U. S. DEPARTMENT OF THE ARMY:	
Trail Rations for Oversnow Traverse Parties	10,416
NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL:	
Coordination and Editorial Offices—International Special Committees	25,000
Publication of Technical Manuals and Other Documents for the World Wide Standardization and Coordination of Scientific Measurements	40,520
Support of Polar Operations Staff	68,600
Support of the International Geophysical Year Polar Operations Staff	70,000
U. S. WEATHER BUREAU:	
Antarctic Planning Staff	92,313
Procurement of Equipment and Supplies—Antarctic Program	14,000
WORLD DATA CENTER	
NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL:	
Rocket and Satellite World Data Center A	21,000
NATIONAL BUREAU OF STANDARDS:	
Archives in Airglow and Ionosphere	21,425
U. S. WEATHER BUREAU:	
Archives in Meteorology	32,500
EARTH SATELLITE—SCIENTIFIC EXPERIMENTS	
AIR FORCE CAMBRIDGE RESEARCH CENTER:	
Satellite Polar Propagation Measurements	25,000
UNIVERSITY OF ALASKA:	
Auroral Zone Phenomena	167,900
U. S. DEPARTMENT OF THE ARMY:	
Meteorological Observations From an Earth Satellite	222,000
CALIFORNIA INSTITUTE OF TECHNOLOGY:	
Special Equipment and Engineering Services	147,100
FRANKLIN INSTITUTE:	
Determination of the Flux of Heavy Primary Cosmic Ray Nuclei	15,000
UNIVERSITY OF ILLINOIS:	
Radio Interferometry and Data Analysis	46,250
STATE UNIVERSITY OF IOWA:	
Construction and Testing of Equipment and Supplies for Cosmic Ray Observations	71,015
LINFIELD RESEARCH INSTITUTE:	
Absolute Signal Strength and Frequency Measurements	42,000
UNIVERSITY OF MARYLAND:	
Measurement of the Meteoric Dust Erosion of the Satellite Skin	28,750
NATIONAL BUREAU OF STANDARDS:	
Interferometer and Doppler Measurements	156,000
Electron Density Profiles	65,700
OFFICE OF NAVAL RESEARCH:	
Solar Radiation Measurements	30,000
Special Equipment and Engineering Services for Scientific Experiments	1,400
PENNSYLVANIA STATE UNIVERSITY:	
Doppler Measurements from Spaced Locations	84,950
RESEARCH INSTITUTE FOR ADVANCED STUDIES:	
Determination of the Flux of Heavy Primary Cosmic Ray Nuclei	61,750
STANFORD UNIVERSITY:	
Electron Density and Radio Propagation Studies	112,000
UNIVERSITY OF WISCONSIN:	
Energy Budget of the Earth	65,700
EARTH SATELLITE—TELEMETERING OF SCIENTIFIC DATA	
CALIFORNIA INSTITUTE OF TECHNOLOGYS	
Telemetry Recording and Technical Assistance	30,980
EARTH SATELLITE—SCIENTIFIC COORDINATION	
NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL:	
Operating Expenses of Program Coordination Staff	72,800
Scientific Coordination of the Earth Satellite Program	102,000
EARTH SATELLITE—OPTICAL TRACKING	
U. S. DEPARTMENT OF THE ARMY:	
Establishment of an Interim Optical Network	121,200
SMITHSONIAN INSTITUTION:	
Cost of Optical Tracking Stations	100,200
Operation of Optical Tracking Stations	778,325
Administration of a Visual Observing Program	80,500
Observation Reduction, Analysis, and Central Operation	351,800
Direct Administrative Costs	234,000
SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS:	
Volunteer Photographic Tracking	18,000
	6,526,558

APPENDIX F

Fellowship Awards—Fiscal Year 1958

Names, Residences, and Fields of Study of Individuals Awarded National Science Foundation Fellowships

ALABAMA

Predoctoral

COULTER, C. ALTON, Phenix City, Physics.
ELDER, JOHN W., S. J., Mobile, Chemistry.
MAHOWALD, ANTHONY P., S. J., Mobile, Zoology.
SANDERSON, JACK T., Birmingham, Physics.

Science Faculty

BAILEY, WILFORD S., Auburn, Agriculture.
PATRICK, KEITH H., Auburn, Agriculture.
WATSON, RAYMOND C., Jr., Anniston, Engineering.

ARIZONA

Predoctoral

FENWICK, ROBERT B.,[1] Phoenix, Engineering.
JUSTICE, KEITH E., Tucson, Zoology.
RAUCH, HERBERT E.,[1] Tucson, Engineering.

Postdoctoral

HALE, KENNETH L., Tucson, Anthropology.

Science Faculty

HALL, DAVID J., Tucson, Engineering.

ARKANSAS

Predoctoral

EVERETT, WAYNE, Benton, Biochemistry.
HILL, JOHN W., Fayetteville, Chemistry.
LOCKHART, ANDREW P., Van Buren, Engineering
PAGE, LEROY E., Springdale, Engineering.
RUSSELL, CHARLES D., El Dorado, Chemistry.
STALLINGS, JOHN R., JR., Morrilton, Mathematics.

Postdoctoral

WASSON, JOHN T., Springtown, Chemistry.

Science Faculty

WILLIAMS, RALPH, Magnolia, Agriculture.

CALIFORNIA

Predoctoral

ALBRIGHT, NORMAN W., Pasadena, Physics.
ALLEN, MARCIA K., Stanford, Genetics.
ALMOND, CAROLYN, San Leandro, Microbiology.
BALL, JAMES S., Albany, Physics.
BANKS, PHILIP O., Sacramento, Earth Sciences.
BERLOWITZ, LAURENCE J., Los Angeles, Zoology
BOULWARE, DAVID G., Lafayette, Physics.
BROSEMER, RONALD W.,[1] Oakland, Biochemistry.
BROWN, LOWELL S., Visalia, Physics.
BROWN, ROBERT T., Riverside, Physics.
BROWN, STEPHEN L., Palo Alto, Physics
BURNS, JOHN M., Berkeley, Genetics.
CHRISTENSEN, MARK N., Berkeley, Earth Sciences.
COLLINS, GEORGE F., Jr., Los Angeles, Chemistry.
CZAMANSKE, GERALD K., Stanford, Earth Sciences.
DALTON, EDWARD K., Riverside, Physics.
DAY, GENE F., Alameda, Physics.
DAYBELL, MELVIN D., Pasadena, Physics.
DEVOTO, RICHARD H., Palo Alto, Engineering.
DEAL, PAUL H.,[1] Sacramento, Zoology.
DODD, JAMES R., Pasadena, Earth Sciences.
EGGER, M. DAVID,[1] Bakersfield, Psychology.
EISENBERG, JOHN, Berkeley, Zoology.
ENDERTON, HERBERT, San Jose, Mathematics.
FISH, ROBERT A., Los Altos, Chemistry.
FONG, PAUL, San Francisco, Mathematics.
FOSTER, EDWARD M., Gardena, Mathematical Economics.
GAGE, DONALD H., Durham, Engineering.
GILLESPIE, BARBARA, Arcadia, Botany.
GIULIANO, CONCETTO R., Gardena, Chemistry.
GOLDENBERG, H. MARK, Los Angeles, Physics.
GOLDSBOROUGH, JOHN, Stanford, Physics.
GRIFFITHS, ROBERT B., Sunnyvale, Physics.
GUNCKEL, THOMAS L., II,[1] Pomona, Engineering.
HAGGE, DONALD E.,[1] Berkeley, Physics.
HAND, LOUIS N., Palo Alto, Physics.
HAUGEN, RUTH M., Pasadena, Psychology.
HOLLAND, JEROME T., La Mirada, Mathematics.
HOLLIDAY, DENNIS, Alhambra, Physics.
HONE, DANIEL W., San Francisco, Physics.
HONSAKER, JOHN L., Pasadena, Physics.
HULTGREN, GLEN O., Berkeley, Chemistry.
HUNDLEY, RICHARD O., Pasadena, Physics.
IRVINE, WILLIAM M., Beverly Hills, Physics.
JORDAN, PETER C. H., Los Angeles, Chemistry.
JOSEPHSON, ROBERT K., Los Angeles, Zoology.
KAPLAN, DAVID, Granada Hills, Philosophy of Science.
KELLY, BEATRICE L., Monterey Park, Microbiology.

[1] Declined.

KIEFER, EDGAR F., Pasadena, Chemistry.
KLEINMAN, LEONARD, Berkeley, Physics.
LARSEN, JIM, Pomona, Earth Sciences.
LEBOVITZ, NORMAN R., Los Angeles, Physics.
LEESON, DAVID B., Los Angeles, Engineering.
LEITNER, PHILIP, Orinda, Zoology.
LIBBY, WILLIAM J., Berkeley, Genetics
LINDEN, DONALD A., San Francisco, Engineering.
LINDSAY, ROBERT, Hillsborough, Engineering.
LOOMIS, ALDEN A., Palo Alto, Earth Sciences.
MACIEL, GARY E., Livermore, Chemistry.
MACMILLAN, ARCHIE J., Long Beach, Engineering.
MANJARREZ, VICTOR, S. J., San Francisco, Mathematics.
MARSHALL, J. HOWARD, III, Pasadena, Physics.
MASON, DAVID, Berkeley, Botany.
MCCONKEY, EDWIN H., Berkeley, Zoology.
MCCUEN, PETER A., Bakersfield, Engineering.
MCCUNE, DELBERT C., Saratoga, Botany.
MILLER, ROGER H., Palo Alto, Physics.
MONK, JAMES D., Danville, Mathematics.
MORLAN, GEORGE D.,[1] Pasadena, Mathematics.
MRAZEK, ROBERT V., San Bernardino, Engineering.
MUFFLER, L. J. PATRICK,[1] Claremont, Earth Sciences.
MULLER, RICHARD S., Los Angeles, Engineering.
NANDI, JEAN, Berkeley, Zoology.
NEIGHBOR, JAMES E., Lafayette, Physics.
NEVILLE, DONALD E., Los Angeles, Physics.
NEVILLE, RICHARD C., South Gate, Engineering.
OGLESBY, LARRY C.,[1] Atascadero, Zoology.
ORBACH, RAYMOND L., Los Angeles, Physics.
ORIANS, GORDON H., Albany, Zoology.
ORTENBURGER, IRENE B.,[1] Los Altos, Physics.
PARKER, EVELYN D., San Francisco, Biochemistry.
PARKER, RONALD B., Berkeley, Earth Sciences.
PICCOLINI, RICHARD J., Los Angeles, Chemistry.
PROSCHAN, FRANK, Sunnyvale, Mathematics.
PRUITT, WILLIAM E., Stanford, Mathematics.
PURVES, WILLIAM K., JR., Sacramento, Botany.
QUINN, EDWARD P.,[1] Berkeley, Engineering.
REINECKE, MANFRED G., Albany, Chemistry.
RENEAU, LEON R., San Mateo, Engineering.
RICHARDS, PAUL L., Riverside, Physics.
ROBERTSON, BALDWIN, Los Angeles, Physics.
ROSENBERG, DAVID, North Hollywood, Genetics.
ROYCE, EDWIN B., Pasadena, Physics.
SCHULTZ, CLAUDE H.,[1] Davis, Physics.
SEDERHOLM, CHARLES H., Concord, Chemistry.
SHAIN, STEPHEN,[1] San Anselmo, Engineering.
SLAGGIE, E. LEO, Albany, Physics.
SMITH, RICHARD G.,[1] Glendora, Engineering.
SMITH, ROBERT B.,[1] Vista, Chemistry.
STONE, CHARLES J.,[1] Van Nuys, Mathematical Economics.
STONE, JEREMY J., Menlo Park, Mathematical Economics.
STRANG, WILLIAM G., Los Angeles, Mathematics.
STROMBOTNE, RICHARD L., Berkeley, Physics.
SWANSON, DARWIN L., Bakersfield, Physics.
TAYLOR, HUGH P., Jr., Los Angeles, Earth Sciences.
THACHER, PHILIP D.,[1] Auberry ,Physics.

[1] Declined.

THIEBAUX, MARTIAL L., JR., Whittier, Physics.
THIESSEN, WILLIAM E., Oakland, Chemistry.
TINDERHOLT, VICTOR E., Santa Monica, Genetics.
VOGEL, MARTIN, Los Angeles, Chemistry.
WAGNER, WILLIAM G., South Pasadena, Physics.
WATTENBURG, WILLARD H., Greenville, Engineering.
WEBB, SAWNEY D., Los Angeles, Zoology.
WEDDLE, ORVILLE H., Granada Hills, Medical Sciences.
WERTHAMER, N. RICHARD, Encino, Physics.
WILCOX, WILLIAM R., Albany, Engineering.
WILLIS, JOHN S., Pasadena, Zoology.
WILSON, DONALD M., Los Angeles, Zoology.
WILSON, GARTH H., Oakland, Engineering.
WOOLFOLK, ROBERT W., Riverside, Chemistry.
WULFF, DANIEL L., Altadena, Chemistry.
YOUNG, LAEL M., Mentone, Mathematics.

Postdoctoral

BARTH, CHARLES A., Jr., Encino, Physics.
BREIMAN, LEO, Berkeley, Mathematics.
CADE, TOM J., Glendale, Zoology.
CAMPBELL, ALLAN M., Stockton, Microbiology.
FEINSTEIN, AMIEL, Menlo Park, Mathematics.
HENRY, DAVID W., Los Angeles, Chemistry.
HIRATA, ARTHUR A., Los Angeles, Biochemistry.
HOMMERSAND, MAX H., La Mesa, Botany.
MASON, RICHARD A., Davis, Agriculture.
MUNZ, FREDERICK W., Claremont, Zoology.
OLANDER, HARVEY, Davis, Agriculture.
PEVEHOUSE, BYRON C., San Francisco, Medical Sciences.
SHREVE, RONALD L., Big Pine, Earth Sciences.
SMITH, DARWIN W., Pasadena, Chemistry.
SPARKS, ROBERT A., Los Angeles, Chemistry.
SPENCER, GLENN H., Lafayette, Chemistry.
TANGHERLINI, FRANK R., Palo Alto, Physics.
URETSKY, JACK L., Albany, Physics.
WEITZNER, HAROLD, San Francisco, Physics.

Senior Postdoctoral

ALPEN, EDWARD L., San Mateo, Biophysics.
BADE, WILLIAM G., Berkeley, Mathematics.
BERN, HOWARD A., Berkeley, Zoology.
BERSON, JEROME A., Los Angeles, Chemistry.
CUSHING, JOHN E.,[1] Santa Barbara, General Biology.
EDELMAN, ISIDORE S.,[1] San Francisco, Biochemistry.
FUHRMAN, FREDERICK A., Stanford, Zoology.
GOODWIN, WILLARD E., Los Angeles, Medical Sciences.
GROGAN, RAYMOND G., Davis, Botany.
JEFFRIES, CARSON D., Berkeley, Physics.
NORBECK, EDWARD, Berkeley, Anthropology.
ROYDEN, HALSEY L., Los Altos, Mathematics.
SCHWIMMER, SIGMUND, Berkeley, Biochemistry.
WOLFF, JAN, San Anselmo, Medical Sciences.

Science Faculty

BARRETT, E. OTTO, El Sobrante, Astronomy.
BEEKS, RICHARD M., Claremont, Botany.
BLACK, ARTHUR L., Davis, Biochemistry.
COAD, PETER, Orange, Chemistry.
GORMAN, CHARLES M., San Francisco, Chemistry.
HARVILLE, JOHN P., Los Gatos, Zoology.
LARSEN, CHARLES M., Santa Clara, Mathematics.

PEQUEGNAT, WILLIS E., Claremont, General Biology.
PHILLIPS, EDWIN A., Claremont, Botany.
PILLSBURY, THOMAS S., Concord, Biochemistry.
PITTS, THOMAS D., Los Angeles, Zoology.

COLORADO

Predoctoral

IRWIN, CYNTHIA, Morrison, Anthropology.
LONGLEY, WILLIAM W., Jr., Boulder, Physics.
NEEPER, DONALD A., Monte Vista, Physics.
SAKAKURA, ARTHUR Y., Boulder, Physics.
SPENCER, ALBERT W., Fort Collins, Zoology.
TEN BROEK, BERNARD J., Boulder, Zoology.
VIERECK, ELEANOR G., Boulder, Zoology.

Postdoctoral

HERIN, REGINALD A., Jr., Ft. Collins, Agriculture.
POTTASCH, STUART R., Boulder, Astronomy.

Senior Postdoctoral

PETERSEN, WILLIAM, Boulder, Demography.

Science Faculty

ESTLOW, WILLIS L., Boulder, General Biology.
KOCH, WILLIAM G., Greeley, Chemistry.
TULIN, LEONARD G., Boulder, Engineering.

CONNECTICUT

Predoctoral

BALDWIN, DAVID E., West Hartford, Physics.
BOWER, GORDON H.,[1] New Haven, Psychology.
BINGHAM, CHRISTOPHER,[1] Colchester, Mathematics.
BUYRN, AUDREY B., Hartford, Physics.
CHURCHILL, LINDSEY, Jr., Meriden, Mathematical Sociology.
DOANE, WINIFRED W., West Haven, Genetics.
DOLLARD, JOHN D., Hamden, Physics.
FARNHAM, ANN E., Storrs, Microbiology.
FOOTE, CHRISTOPHER S., West Hartford, Chemistry.
FRASER, EDWARD C.,[1] Simsbury, Engineering.
HIGBIE, PAUL R., West Hartford, Physics.
HILFER, S. ROBERT, New Haven, Zoology.
KAHN, DONALD W., Bethany, Mathematics.
KAHN, PHYLLIS, Bethany, Biophysics.
MCCARTHY, CHARLES A., New Haven, Mathematics.
MCCOLM, DOUGLAS, New Haven, Physics.
MERMIN, N. DAVID,[1] New Haven, Physics.
MILLER, JOHN H., New Haven, Botany.
POLINSKY, MARTHA I. V., New Haven, Zoology.
SCOVILLE, RICHARD, Torrington, Mathematics.
SELTZER, RICHARD J., Hartford, Chemistry.
STEPHENSON, R. RHOADS, Mt. Carmel, Engineering.
TANENBAUM, B. SAMUEL, New Haven, Physics.
WEBBER, BROOKE, B., Bridgeport, Genetics.
WILLIAMS, FREDERICK N., New Haven, Zoology.

Postdoctoral

JACOBSON, ROBERT A., Waterbury, Chemistry.
MEIGS, ROBERT A., Newington, Biochemistry.
SIEGEL, JOHN H., New Haven, Medical Sciences.
STILLINGER, FRANK H., Jr., New Haven, Chemistry.
TIFFT, WILLIAM G., Seymour, Astronomy.
WORONICK, CHARLES L., Meriden, Biochemistry.

Senior Postdoctoral

KLINE, DANIEL L.,[1] Bethany, Zoology.
SCHAFER, RICHARD D., New London, Mathematics.

Science Faculty

CLEVERDON, ROBERT C., Coventry, General Biology.
RHODES, MARION B., Woodstock Valley, Chemistry.
SAMUELSON, HENRY H., Storrs, Physics.
SCHAFER, ALICE T., New London, Mathematics.
THOMSON, BETTY F., New London, Botany.

DELAWARE

Predoctoral

DAY, BENJAMIN D., Newark, Physics.
JENNINGS, U. DUANE, Wilmington, Engineering.
LORAND, JOHN P.,[1] Wilmington, Chemistry.

Science Faculty

BENDA, STEPAN V., Dover, Physics.

DISTRICT OF COLUMBIA

Predoctoral

BRANT, DAVID A., Chemistry.
DADE, EVERETT C., Mathematics.
EHRMAN, JOHN R., Physics.
FELTON, RONALD H., Chemistry.
HACKMAN, MATTHEW, Mathematics.
HOFFMAN, FREDERICK, Mathematics.
HOYME, LUCILE E., Anthropology.
HUBBARD, ROBERT L., Physics.
OLIVER, DAVID W., Physics.
PRESNALL, DEAN C., Earth Sciences.

Science Faculty

BUTCHER, GEORGE H., Mathematics.

FLORIDA

Predoctoral

BOND, FREDERICK T., Jr., Tavernier, Chemistry.
BROCKMAN, HERMAN E., Tallahassee, Genetics.
FOX, EVELYN, Miami Beach, Physics.
IRWIN, CAROL A., Jacksonville, Anthropology.
NEALY, DAVID L.,[1] Sarasota, Chemistry.
PITTMAN, RICHARD G., Jr., Jacksonville Beach, Chemistry.
RALPH, PETER,[1] Avon Park, Physics.
ROSEN, GERALD H., Surfside, Physics.
SCHWAMB, FRANK E., Miami, Physics.
WAGNER, ALVIN, Tallahassee, Zoology.

Postdoctoral

HUBBARD, PAUL S., Jr., St. Petersburg, Physics.

Senior Postdoctoral

FEDER, WILLIAM A., Orlando, Botany.
PERRY, THOMAS O., Gainesville, Genetics.

Science Faculty

SCOTT, LINUS A., Gainesville, Engineering.

[1] Declined.

GEORGIA

Predoctoral

BRADLEY, NEAL E., Decatur, Mathematics.
BUTLER, JAMES R., Macon, Earth Sciences.
DOWNS, JAMES P., Savannah, Earth Sciences.
HOWE, JOHN A.,[1] Blue Ridge, Chemistry.
JOHNSON, CHARLES S., Jr., Albany, Chemistry.
MCMILLAN, D. RUSSELL, Jr., Atlanta, Mathematics.

Postdoctoral

GILBERT, THOMAS F., Athens, Psychology.

Science Faculty

CLEMMONS, JOHN B., Savannah, Mathematics.
HALL, ALEXANDER A., Albany, Physical Sciences General.

IDAHO

Predoctoral

BRANDVOLD, GLEN E., Coeur d'Alene, Engineering.
BURDICK, GLENN A., Pocatello, Physics.
NIELSON, CLAIR W., Pocatello, Physics
REMSBERG, LOUIS P., Jr., Caldwell, Chemistry.
WILLMORTH, JOHN H.,[1] Boise, Engineering.

Senior Postdoctoral

TISDALE, EDWIN W., Moscow, Agriculture.

ILLINOIS

Predoctoral

BASS, HYMAN, Chicago, Mathematics.
BERKSON, EARL R., Chicago, Mathematics.
BJORKEN, JAMES D., Park Ridge, Physics.
BLISS, JAMES C., Chicago, Engineering.
BODINE, ALAN G., Macomb, Physics.
BRESNAHAN, TIMOTHY M., Chicago, General Biology.
BREWER, RICHARD D., Murphysboro, Zoology.
BUCCINO, ALPHONSE, Chicago, Mathematics.
BUDDEMEIER, ROBERT W., Urbana, Chemistry.
CARPENTER, WAYNE, Champaign, Chemistry.
CHASE, STEPHEN U., Chicago, Mathematics.
CHILTON, FRANK M., Jr., Chicago, Physics.
COLEMAN, SIDNEY, Chicago, Physics.
CORRELL, DAVID, Lombard, Zoology.
DOVE, WILLIAM F., Jr., Oak Park, Biochemistry.
ECKSTEIN, SHULAMITH G., Chicago, Physics.
EDWARDS, HAROLD M., Jr., Champaign, Mathematics.
FOODEN, JACK, Chicago, General Biology.
FRAENKEL, DAN G., Urbana, Medical Sciences.
FREIFELDER, DAVID M., Waukegan, Biophysics.
GAGGIOLI, RICHARD A.,[1] Highwood, Engineering.
GINSBERG, DONALD M., Chicago, Physics.
GOLDBERG, JAY M., Chicago, Psychology.
GRINNELL, ALAN D.,[1] Carbondale, Zoology.
HAGEN, CARL R., Chicago, Physics.
HAHN, FRANK J., Champaign, Mathematics.
HANNAUER, GEORGE, III, La Grange, Mathematics.
HARBKE, RICHARD C., Wood River, Earth Sciences.
HARRISON, MICHAEL J., Chicago, Physics.
HASCHEMEYER, AUDREY E., Chicago, Chemistry.
HILL, ROBERT N., Evanston, Physics.
HOGAN, JERRY A., Chicago, Psychology.
JAMESON, A. KEITH, Champaign, Chemistry.
JOSEPH, DAVID W., Wheaton, Physics.
KALTENBRONN, JAMES S., New Baden, Chemistry.
KAPLAN, CECILE, Chicago, Chemistry.
KERMICLE, JERRY L., Dundus, Genetics.
KERTESZ, DENIS J., Glenview, Chemistry.
KINGSLEY, JACK D., Champaign, Physics.
KLEMENT, WILLIAM, Jr.,[1] Bensenville, Physics.
LEVENBERG, MILTON, Chicago, Chemistry.
LEVINE, MICHAEL J., Chicago, Physics.
LLOYD, RONALD M., Oak Park, Earth Sciences.
LOTSOFF, SEYMOUR N.,[1] Chicago, Engineering.
MACLEAN, DAVID, Winnetka, Chemistry.
MILLER, DONALD A., Mt. Prospect, Engineering.
MINN, FREDERICK L., Waukegan, Chemistry.
MOORHEAD, LYNN, Poplar Grove, Biochemistry.
MORGAN, ROBERT L.,[1] Chicago, Chemistry.
MOTTERSHEAD, THOMAS,[1] East St. Louis, Physics.
NELSON, DALE,[1] Ottawa, Mathematics.
OLOFSON, ROY A., Chicago, Chemistry.
PARTOS, RICHARD, Chicago, Chemistry.
PAULIKAS, GEORGE A., Champaign, Physics.
PAULUS, HENRY P., Winnetka, Biochemistry.
RENICK, REBECCA J., Manhattan, Chemistry.
RESING, HENRY, Chicago, Chemistry.
REYNOLDS, JOHN C., Glen Ellyn, Physics.
ROGERS, KENDAL T., Urbana, Physics.
ROSIN, ROBERT F., Highland Park, Mathematical Psychology.
RUST, JAMES H., Pekin, Engineering.
SCHLESSINGER, DAVID, Chicago, Biochemistry.
SHREFFLER, DONALD C., Kankakee, Genetics.
SORENSEN, HANS O.,[1] Chicago, Engineering.
STEARNS, RICHARD E., Wilmette, Mathematics.
TALBOTT, RICHARD, L., Elmhurst, Chemistry.
TANGORA, MARTIN C., Evanston, Mathematics.
TILLSON, MARTHA A., LaGrange, Zoology.
TINKLER, JACK D., Lansing, Engineering.
TOWBER, JACOB, Chicago, Mathematics.
TROZZOLO, ANTHONY M., Chicago, Chemistry.
VRENTAS, JAMES, Danville, Engineering.
WALL, ROBERT E., Mulberry Grove, Chemistry.
WARD, HAROLD N.,[1] Evanston, Mathematics.
WARDEN, JOHN C., Danville, Botany.
WEINER, DANIEL, Chicago, Physics.
WEINER, GEORGE T., Chicago, Mathematical Economics.
WENTZEL, DONAT G., Chicago, Physics.
WOLF, JOSEPH A., Chicago, Mathematics.
YOUNGDAHL, CARL K., Chicago, Mathematics.
YUND, RICHARD A., Farina, Earth Sciences.
ZIMMER, RUSSEL L., Springfield, Zoology.
ZIMMERMAN, STEVEN B., Chicago, Biochemistry.

Postdoctoral

ARONSON, ARTHUR I., Champaign, Microbiology.
BAUR, MARIO E., Chicago, Chemistry.
FEDER, WALTER, Chicago, Medical Sciences.
GLASKY, ALVIN J., Chicago, Biochemistry.
GOLUB, GENE H., Chicago, Mathematics.
IKEDA, RICHARD M., Champaign, Chemistry.
LEPLEY, ARTHUR R., Peoria, Chemistry.

[1] Declined.

LEVY, H. RICHARD, Chicago, Medical Sciences.

Senior Postdoctoral

BECKER, ROBERT A.,[1] Urbana, Physics.
KING, ROBERT C., Evanston, Genetics.
SEGAL, IRVING E., Chicago, Mathematics.

Science Faculty

GALL, HAROLD J. F., Chicago, Zoology.
JOHNSON, VERNOY A., Chicago, Mathematics.
MATHERS, CAROL K., De Kalb, Zoology.
PEART, ROBERT M., Urbana, Engineering.
PHIPPS, HARRIS E., Charleston, Chemistry.
STEIN, HOWARD, Chicago, Mathematics.
VAN LAER, JOHN, Chicago, Psychology.
WATSON, WALTER W., Chicago, Physics.

INDIANA

Predoctoral

ALLTOP, WILLIAM O., Indianapolis, Mathematics.
BARONOWSKY, PAUL E., Evansville, Biochemistry.
BELINFANTE, JOHAN, West Lafayette, Physics.
DAVIDSON, ERNEST R., Terre Haute, Engineering.
FALLER, JAMES E., Mishawaka, Physics.
FASSNACHT, ROBERT,[1] South Bend, Physics.
FISH, FEROL F., Jr., East Chicago, Earth Sciences.
FISHER, ROBERT T., Indianapolis, Physics.
FRANCIS, GEORGE K.,[1] South Bend, Mathematics.
HUEBER, FRANCIS M., Indianapolis, Earth Sciences.
HUNTER, RALPH E., LaPorte, Earth Sciences.
JENKINS, THOMAS M., Indianapolis, Mathematics.
KLEIN, ATTILA O., Bloomington, Botany.
LEGG, JAMES C.,[1] Windfall, Physics.
LUNDY, RICHARD A., Connersville, Physics.
MERCER, EDWARD E., West Lafayette, Chemistry.
PARKER, RICHARD B., Hanover, Zoology.
POHL, WILLIAM F., Michigan City, Mathematics.
PRAIRIE, RICHARD L., Fort Wayne, Biochemistry.
RAGLAND, THOMAS E., Bloomington, Biochemistry.
RAY, CLAYTON E., Indianapolis, Earth Sciences.
SANE, JAMES O., Hammond, Engineering.
SCHERER, KIRBY V., Jr., Evansville, Chemistry.
SCHRENK, GEORGE L., Seymour, Physics.
SHIELDS, JAMES E., Marion, Biochemistry.
SIMS, CHARLES C.,[1] Elkhart, Mathematics.
STARBUCK, WILLIAM H., Portland, Mathematics and Social Sciences.
VOUGHT, ELDON J., South Bend, Mathematics.
WEIL, JON D., Evansville, Genetics.
WILT, FRED H., Syracuse, Zoology.

Postdoctoral

BLOCK, RICHARD E., Bloomington, Mathematics.
STILLER, MARY L., Connersville, Biochemistry.

Senior Postdoctoral

SHINER, VERNON J., Jr., Bloomington, Chemistry.
WRUBEL, MARSHAL H., Bloomington, Astronomy.

Science Faculty

BAUMGART, JOHN K., North Manchester, Mathematics.
DYER-BENNET, JOHN W., Lafayette, Mathematics.
JONES, HOBART W., Lafayette, Agriculture.
SCHLEEF, DANIEL J., Lafayette, Engineering.

IOWA

Predoctoral

ANDERSON, WILLIAM J., Ames, Engineering.
BELL, JERRY A., Bettendorf, Chemistry.
CHRISTENSEN, STANLEY H., Ames, Physics.
ECKER, RICHARD E., Ames, Microbiology.
FORBES, MILTON L., Iowa City, General Biology.
GOODRICH, KENNETH P., Iowa City, Psychology.
GRAHAM, JOHN B.,[1] Brooklyn, Engineering.
ROBERTS, WALDEN K., Lamoni, Chemistry.
SELIM, ROBERT G., Lanyon, Chemistry.
STUDIER, F. WILLIAM, Waverly, Biophysics.
SUNDQUIST, BRUCE, Davenport, Engineering.
WAGNER, ALLAN R., Davenport, Psychology.
WATSON, PATTY J., Sheffield, Anthropology.
WOOLDRIDGE, CHARLES E., Mason City, Engineering.

Postdoctoral

LLOYD, MONTE, Sioux City, Zoology.
MARTIN, DEAN F., Grinnell, Chemistry.

Senior Postdoctoral

BOLIE, VICTOR W., Ames, Engineering.
EYRING, LEROY, Iowa City, Chemistry.

Science Faculty

GILBERT, WALTER M., Ames, Mathematics.
GREEN, ROBERT W., Ames, Physics.
HARRENSTEIN, HOWARD P., Ames, Engineering.
SORENSON, MAUDE J., Whiting, Physics.
WILD, WAYNE G., Storm Lake, Physics.

KANSAS

Predoctoral

BEAM, JOHN E.,[1] Ottawa, Physics.
DALY, HOWELL V., Jr., Lawrence, Zoology.
DAVIES, HAROLD W., Emporia, Botany.
DAVIS, JOHN A., Jr., Topeka, Engineering.
FRANZEN, HUGO F., Lawrence, Chemistry.
HAINES, HOWARD B., Kansas City, Zoology.
HALL, JOHN B., Mission, Medical Sciences.
HANSON, DAVID L., Wichita, Mathematics.
HEIDER, KARL G., Lawrence, Anthropology.
HOBBS, CHARLES F., Lawrence, Chemistry.
JACKSON, THOMAS C.,[1] Hutchinson, Engineering.
KING, WYNETKA A., Emporia, Zoology.
RAMSAY, ARLAN,[1] Dodge City, Mathematics.
RETTENMEYER, CARL W., Lawrence, Zoology.
RICHERT, STUART, Wichita, Physics.
ROGERS, GARY B., Manhattan, Engineering.
SCHLAGER, GUNTHER, Lawrence, Zoology.
SINKHORN, RICHARD D., Wichita, Mathematics.
SOMMER, WARREN T., Manhattan, Physics.
STRATTAN, ROBERT D., Newton, Engineering.

[1] Declined.

STRICKLER, STEWART J., Hutchinson, Chemistry.
WEIDLER, RICHARD D., Minneapolis, Engineering.

Postdoctoral

FARRAR, THOMAS C., Wichita, Chemistry.
GASTON, LAMONT W., Lawrence, Medical Sciences.

Science Faculty

CARMAN, KENNETH S., Salina, Mathematics.
SMITH, BOB L., Manhattan, Engineering.

KENTUCKY

Predoctoral

COOK, MAURICE G., Hatton, Agriculture.
KOEHL, WILLIAM J., Jr., Covington, Chemistry.
KONSLER, THOMAS R., Henderson, General Biology.
LIND, JOHN E., Jr., Louisville, Chemistry.
RIGGSBY, W. STUART, Ashland, Biophysics.

Postdoctoral

DIXON, JOE B., Fulton, Agriculture.

Science Faculty

MIDDENDORF, WILLIAM H., Covington, Engineering.

LOUISIANA

Postdoctoral

HAMILTON, JOSEPH H., Jr., Tallulah, Physics.

Science Faculty

CROW, A. BIGLER, Baton Rouge, Agriculture.
DANTIN, ELVIN J., Baton Rouge, Engineering.
STONE, EDWARD J., Baton Rouge, Agriculture.
TULLIER, PETER M., Jr., Lafayette, Mathematics.

MAINE

Predoctoral

BERKELMAN, KARL,[1] Lewiston, Physics.
JENNESS, JONATHAN, North Bridgton, Anthropology.
KNIGHT, WILLIAM S., Auburn, Chemistry.
LARY, EDMUND C., West Scarboro, Engineering.
WALCH, CAROLYN R., Portland, Zoology.

Postdoctoral

BRUSH, STEPHEN G., Orono, Physics.

Science Faculty

SCOTT, ALLAN C., Waterville, General Biology.

MARYLAND

Predoctoral

BROWN, ROBERT L., Kensington, Chemistry.
CARSON, DANIEL H.,[1] Baltimore, Psychology.
CURTIS, EDWARD B., Annapolis, Mathematics.
DORFMAN, JAY R., Baltimore, Chemistry.
GOREN, SIMON L., Baltimore, Engineering.
HAUK, PETER, Chevy Chase, Chemistry.
HAUK, ROSALIND, Chevy Chase, Medical Sciences.
HERMES, MATTHEW E., Takoma Park, Chemistry.
KAUFMANN, JOHN H., Towson, Zoology.
KURZWEG, ULRICH H.,[1] Silver Spring, Physics.
MORTENSEN, GLEN A., Poolesville, Engineering.
SHARNOFF, MARK, Chevy Chase, Physics.
SIGER, ALVIN, Baltimore, Biochemistry.
STAGNER, MARILYN L., Bethesda, Zoology.
TAEUBER, KARL E., Hyattsville, Demography.
TRUMBORE, ROGER H., College Park, Zoology.
VAN TREES, HARRY L., Jr.,[1] Glen Burnie, Engineering.
VLASES, GEORGE C., Pikesville, Engineering.
WARNER, JONATHAN R., Bethesda, Biophysics.
WHITLOCK, HOWARD W., Jr., University Park, Chemistry.
ZDANIS, RICHARD A., Baltimore, Physics.

Postdoctoral

GOLDSMITH, TIMOTHY H., Silver Spring, Zoology.
RHODES, WILLIAM C., Baltimore, Biochemistry.
STEINBERGER, EMIL, Rockville, Medical Sciences.

Senior Postdoctoral

PAYNE, LAWRENCE E., Olney, Mathematics.

Science Faculty

GUTSCHE, GRAHAM D., Annapolis, Physics.
WHITE, ELIZABETH L., Baltimore, History of Science.

MASSACHUSETTS

Predoctoral

ALTIERI, BARBARA L.,[1] Watertown, Psychology.
ANDERSON, DON L., Brighton, Earth Sciences.
AVERELL, JOHN P., Boston, Physics.
BAYM, GORDON A., Pittsfield, Physics.
BENEDICT, MARY H., Weston, Chemistry.
BIENENSTOCK, ARTHUR, Cambridge, Physics.
BROOKS, RODNEY A., Somerville, Physics.
BROWN, THOMAS A., Cambridge, Mathematics.
COOPER, BERNARD R., Hyde Park, Physics.
COTTER, EDWARD, Chelsea, Earth Sciences.
COURY, FRANCES,[1] Wollaston, Physics.
DIAMOND, JARED M., Brookline, Medical Sciences.
DIXON, WILLIAM B., Fall River, Chemistry.
EVENS, LEONARD, Brookline, Mathematics.
FABENS, AUGUSTUS J., Salem, Mathematics.
FULTON, ROBERT L., East Weymouth, Chemistry.
GIBBS, SARAH P., Lexington, Zoology.
GILLEN, ROSE E., New Bedford, Medical Sciences.
GOLD, L. PETER, Brockton, Chemistry.
GOLDMAN, LAWRENCE, Peabody, Zoology.
GOLDSTEIN, RUBIN, Cambridge, Physics.
GOSSARD, ARTHUR C., Quincy, Physics.
GRANT, WALTER J. C., Lawrence, Physics.
GRISWOLD, ROBERT, New Bedford, Chemistry.
HARRISON, JEAN B., Belmont, Zoology.
HEATH, ROBERT L., Cambridge, Biochemistry.
HOBEY, WILLIAM D., Peabody, Chemistry.
HOLM, RICHARD H.,[1] Falmouth, Chemistry.
HOWARD, WEBSTER E., Jr., Cambridge, Physics.

[1] Declined.

JAMES, ESTELLE M., Revere, Mathematical Economics.
KAYTON, MYRON, Lowell, Engineering.
KNAPP, THOMAS B., Arlington, Mathematics.
KOLENKOW, ROBERT, Cambridge, Physics.
LANGFORD, COOPER H., Holyoke, Chemistry.
LECHNER, ROBERT J., Watertown, Engineering.
LEVIN, ALAN D., Brighton, Psychology.
LIANIDES, SYLVIA P., Lynn, Medical Sciences.
MCGOFF, DAVID J., Somerville, Engineering.
MCPHERSON, KENNETH,[1] Revere, Medical Sciences.
OFENGAND, JAMES, Taunton, Microbiology.
PARSONS, MARGARET C.,[1] Cambridge, Zoology.
PERSHAN, PETER S., Cambridge, Physics.
POULTNEY, SHERMAN K., Leonminster, Physics.
REYNOLDS, DAVID V., Attleboro, Psychology.
ROZIN, PAUL, Cambridge, Psychology.
SAKLAD, MALCOLM H.,[1] Boston, Chemistry.
SCHLESINGER, JAMES W., Cambridge, Mathematics.
SCHWARTZ, LOWELL M., Watertown, Engineering.
SCHWEITZER, PETER E., Cambridge, Mathematics.
WHARTON, LENNARD, Brookline, Chemistry.
WHITNEY, PHILIP R., Marshfield, Earth Sciences.
WILLIAMS, DAVID C., Belmont, Chemistry.
WILLIAMS, RICHARD B., Cambridge, General Biology.
WILSON, KENNETH G.,[1] Concord, Physics.
WYLIE, RICHARD M.,[1] Hingham, Zoology.

Postdoctoral

ALLEN, DAVID W., Watertown, Medical Sciences.
CHOMSKY, AVRAM N., Cambridge, Mathematics & Linguistics.
DAVIS, ROBERT E., Cambridge, Chemistry.
DAVIS, ROWLAND H., Cambridge, Genetics.
DIETER, NANNIELOU, Cambridge, Astronomy.
ERVIN, SUSAN M., Cambridge, Psychology.
FESSENDEN, RICHARD W., North Amherst, Chemistry.
LAW, JOHN H., Jr., Cambridge, Biochemistry.
PALAIS, RICHARD S., Brookline, Mathematics.
RUDOLPH, EMANUEL D., Wellesley, Botany.
SCHNEPS, JACK, Cambridge, Physics.
SEIDEL, GEORGE M., Woronoco, Physics.
WELLS, HERBERT, Brighton, Medical Sciences.

Senior Postdoctoral

AKUTOWICZ, EDWIN J., Cambridge, Mathematics.
ATLAS, DAVID, Newton Center, Earth Sciences.
COHEN, SAUL G.,[1] Lexington, Chemistry.
FALKOFF, DAVID, Auburndale, Physics.
KRAMER, SOL, Woods Hole, Zoology.
MAR, JAMES W., Lincoln, Engineering.
MARTELL, ARTHUR E., Northboro, Chemistry.
SOFFER, MILTON D., Haydenville, Chemistry.

Science Faculty

COLEMAN, JAMES A., Springfield, Astronomy.
CRAWFORD, JEAN V., Wellesley, Chemistry.
DURHAM, MARCIA J., Hingham, Anthropology.
FLAVIN, JOHN W., Chestnut Hill, Zoology.
HILL, SARAH J., Wellesley, Astronomy.
NICKERSON, NORTON H., South Dennis, Botany.
SAVAGE, RICHARD L., Arlington, Engineering.
SPRAGUE, ISABELLE B., South Hadley, Zoology.
WOODLAND, JOHN T., Boston, General Biology.

[1] Declined.

MICHIGAN

Predoctoral

BACHMANN, ROGER W., Ann Arbor, Zoology.
BISQUE, RAMON E., Iron River, Earth Sciences.
BORGESON, DAVID P., Muskegon, Zoology.
BOUWSMA, WARD D., Grand Rapids, Mathematics.
BRAKE, JOHN R.,[1] Stanton, Agricultural Economics.
BUTCHER, SAMUEL S., Gaylord, Chemistry.
CLOSSON, WILLIAM D., Pontiac, Chemistry.
COATS, KEITH H., Ann Arbor, Engineering.
CONLEY, CHARLES C., Royal Oak, Mathematics.
CURTISS, LAWRENCE E., Hastings, Physics.
DENTON, JOHN S., Jr.,[1] Jackson, Mathematics.
DIERCKS, KAY J.,[1] Ypsilanti, Psychology.
DRAGT, ALEX, Grand Rapids, Physics.
FARRAND, WILLIAM R., Ann Arbor, Earth Sciences.
FISCHER, PATRICK C.,[1] Ann Arbor, Mathematics.
GAMSON, WILLIAM A.,[1] Ann Arbor, Psychology.
GARLAND, HOWARD,[1] Detroit, Mathematics.
GARWOOD, DONALD C., Cassopolis, Chemistry.
GRAESSLEY, WILLIAM W., Ann Arbor, Engineering.
HAMELINK, RONALD C., Holland, Mathematics.
KNOLL, GLENN F., Frankenmuth, Engineering.
LITWIN, GEORGE H., Detroit, Psychology.
LOVETT, JAMES S., East Lansing, Botany.
MOHR, CHARLES M.,[1] South Haven, Engineering.
NELSON, FREDERIC F., Grand Rapids, Chemistry.
RUSKIN, ARNOLD M., Saginaw, Engineering.
SANDEL, VERNON, L'Anse, Chemistry.
SCHRIBER, THOMAS J., Muskegon, Engineering.
SHIELDS, PAUL C., South Haven, Mathematics.
SINCIUS, JOSEPH A., East Lansing, Chemistry.
STASHEFF, JAMES,[1] Ann Arbor, Mathematics.
STENGER, ROBERT A., Midland, Chemistry.
VAN DYK, JOANNE, Hancock, Zoology.
WIDEMAN, JAMES M., Detroit, Zoology.
WISER, NATHAN H., Detroit, Physics.
YOUNGDALE, GILBERT A., Detroit, Chemistry.

Postdoctoral

COLEMAN, JOSEPH E., Birmingham, Medical Science.
GEHRING, FREDERICK W., Ann Arbor, Mathematics.
RAYMOND, FRANK A., Ann Arbor, Mathematics.

Senior Postdoctoral

INSULL, WILLIAM, Jr., Zeeland, Medical Sciences.
NANNEY, DAVID L., Ann Arbor, Genetics.

Science Faculty

BAKER, JOHN H., Grand Rapids, Physics.
BJORK, CLARENCE M., Marquette, Mathematics.

HERZOG, BERTRAM, Ann Arbor, Engineering.
LINSLEY, ROBERT M., Traverse City, Earth Sciences.
MICHELSEN, FINN C., Ann Arbor, Engineering.
RINGO, BOYD C., East Lansing, Engineering.
ROSE, FRANK E., Flint, Physics.
SMITH, WAYLAND P., East Lansing, Engineering.
TEODORO, ROSARIO R., Detroit, Microbiology.
WOODBY, LAUREN G., Rosebush, Mathematics.

MINNESOTA

Predoctoral

ACKERBERG, ROBERT C., Minneapolis, Engineering.
ANDERSON, ROBERTA K., Carlton, Microbiology.
APPELBAUM, ELIZABETH, St. Paul, General Biology.
BLOOMQUIST, CAROL, Hutchinson, Chemistry.
BRETHOWER, DALE M., Nevis, Psychology.
CULBERT, PATRICK, Minneapolis, Anthropology.
ERICKSON, GLEN W., Minneapolis, Physics.
GALVIN, FRED, St. Paul, Mathematics.
GUTTMAN, BURTON S.,[1] Minneapolis, Zoology.
HAAKE, PAUL C., Winona, Chemistry.
HANNA, MELVIN W., Minneapolis, Chemistry.
HOLMES, JOHN C., South St. Paul, Zoology.
HUBIN, ALLEN J.,[1] Sandstone, Chemistry.
JORDAN, THOMAS F.,[1] Duluth, Physics.
JUNGAS, ROBERT L., Mountain Lake, Medical Sciences.
KIRCHNER, ROGER B.,[1] Edina, Mathematics.
LARSON, JANE, Minneapolis, Chemistry.
LAURANCE, NEAL, Winsted, Physics.
MILLER, FRANK C.,[1] Little Falls, Anthropology.
MOFFET, ALAN T., Rochester, Physics.
MUELLER, AUGUST P., Mahnomen, Zoology.
OSTERKAMP, DARYL L., Minneapolis, Chemistry.
RADLOFF, LENORE, Minneapolis, Psychology.
REED, FRANCIS K., Austin, Engineering.
RICHARDS, J. IAN, St. Paul, Mathematics.
ROISELAND, DONALD, South St. Paul, Physics.
SCHWARTZ, ROBERT, South St. Paul, Chemistry.
SPANGLER, JOHN D., Atwater, Physics.
SWEENEY, CAROL C., Winnebago, Chemistry.
TORGERSON, RONALD, Minneapolis, Physics.
VISTE, ARLEN E.,[1] Austin, Chemistry.
WALL, ROBERT E., St. Paul, Earth Sciences.
WALSTEDT, RUSSELL E.,[1] Mound, Physics.
WATKINS, MARGARET J., Minneapolis, Zoology.
WILLETT, ROGER D., Northfield, Chemistry.
WITTRY, Sr. ESPERANCE, C. S. J., St. Paul, Zoology.
YOUNGQUIST, MARY J., Balaton, Chemistry.

Postdoctoral

COLLIER, RAYMOND O., Jr., St. Paul, Psychology.
LOVRIEN, REX, Minneapolis, Chemistry.
WINCH, BRADLEY L., Minneapolis, Chemistry.

Science Faculty

BARRY, DAVID G., Mankato, Philosophy of Science.
CAHOON, MARY ODILE, Duluth, Microbiology.
LANGE, JOHN E., St. Cloud, Mathematics.
LANGSJOEN, ARNE N., St. Peter, Chemistry.
RAMETTE, RICHARD W., Northfield, Chemistry.
TRUSK, AMBROSE, Winona, Chemistry.

[1] Declined.

MISSISSIPPI

Predoctoral

CERNY, JOSEPH, III, Oxford, Chemistry.
CLIBURN, J. WILLIAM, Hattiesburg, Zoology.
CROW, TERRY T., Amory, Physics.
DAVIS, JAMES E., State College, Chemistry.
KNOPP, PAUL J., S. J., Pass Christian, Mathematics.
MANGUM, BILLY W., Mize, Chemistry.

Science Faculty

LEWIS, JESSE C., Tougaloo, Mathematics.
WHITE, JESSE S., Cleveland, Zoology.

MISSOURI

Predoctoral

BLACKBURN, THOMAS R., Webster Groves, Chemistry.
BLAIR, JAMES E., Kansas City, Chemistry.
CUSHING, EDWARD J., Steelville, Earth Sciences.
DREITLEIN, JOSEPH F., Ferguson, Physics.
FOX, Sr. M. ALICE MARIE, B. V. M., St. Louis, Zoology.
GRAY, DAVID L., Kansas City, Engineering.
JONES, M. THOMAS, Jennings, Chemistry.
KLOCK, PAUL W., St. Louis, Engineering.
LEMING, HOWELL E., St. Louis, Physics.
MIDGLEY, JAMES E., Kansas City, Physics.
MONTGOMERY, DAVID, Milan, Physics.
PALMER, THEODORE W., Webb City, Mathematics.
PITTMAN, WILLIAM H., Columbia, Chemistry.
PRATT, RICHARD L., Jefferson City, Mathematics.
SCHAEFFER, KATHERINE M. M., Clayton, Earth Sciences.
SCHANUEL, STEPHEN H., Kirkwood, Mathematics.
SLOAN, MARTIN F., University City, Chemistry.
THOMPSON, JOHN G.,[1] Jefferson City, Mathematics.

Postdoctoral

WOOD, GALEN, T., St. Louis, Physics.

Senior Postdoctoral

PFANDER, WILLIAM H., Columbia, Zoology.
VARNEY, ROBERT N., St. Louis, Physics.

Science Faculty

HAMILTON, JOHN M., Parkville, Zoology.
MILLER, OWEN W., St. Louis, Engineering.
PUTERBAUGH, MILTON P., Kansas City, Chemistry.
TAPPMEYER, WILBUR P., Bolivar, Chemistry.
TUDOR, JAMES R., Columbia, Engineering.

MONTANA

Predoctoral

KEMP, DANIEL S., Missoula, Biochemistry.
WOODWARD, LEE A., Missoula, Earth Sciences.

NEBRASKA

Predoctoral

DOMINGO, JOHN J., Weeping Water, Physics.
HAYES, JOHN B., Omaha, Earth Sciences.
QUIST, ARVIN S., Blair, Chemistry.
VAN VLECK, LLOYD D., Clearwater, Agriculture.

Postdoctoral

JENSEN, DONALD D., Osceola, Psychology.
YANDERS, ARMON F., Falls City, Genetics.

NEVADA

Predoctoral

SHANKLAND, THOMAS, Boulder City, Physics.

NEW HAMPSHIRE

Predoctoral

FOLEY, RICHARD J., Durham, Engineering.
KING, R. BRUCE, Rochester, Chemistry.
LYNCH, DAVID D.,[1] Penacook, Physics.
ROBINSON, PETER, Hanover, Earth Sciences.

Postdoctoral

DOYLE, WILLIAM T., Hanover, Physics.

NEW JERSEY

Predoctoral

ADLER, ROBERT J., Westfield, Engineering.
ALBERSHEIM, PETER, Madison, Biochemistry.
ANDERSEN, KENNETH K., Fords, Chemistry.
BALDESCHWIELER, JOHN D., Cranford, Chemistry.
BARAFF, GENE A., Maplewood, Physics.
BARNERT, NYLES N., West Orange, Mathematics.
BARTH, ROBERT H., Jr., Ridgewood, Zoology.
BOOTH, MARY L.,[1] Boonton, Mathematics.
BRAULT, JAMES W., Princeton, Physics.
BROWN, W. STANLEY, Princeton, Physics.
BROWNE, GERARD M., Jersey City, Physics.
BURKE, JAMES A., Andover, Physics.
CALDWELL, DENNIS J., Penns Grove, Chemistry.
CARLSMITH, JAMES M., Summit, Psychology.
CIECIUCH, RONALD F. W., Jersey City, Chemistry.
D'HEEDENE, ROBERT N.,[1] New Vernon, Mathematics.
DOLOTTA, THEODORE A., Vineland, Engineering.
DONNELLY, THOMAS, Princeton, Earth Sciences.
DREISS, GERARD J., Union City, Physics.
FITZGEORGE, JOYCE R.,[1] Trenton, Botany.
FLETCHER, JOHN G., Princeton, Physics.
FORER, ARTHUR, Trenton, General Biology.
FRENCH, BEVAN M., Nutley, Earth Sciences.
GILES, WILLIAM B., South Orange, Mathematics.
GILLE, JOHN C., Teaneck, Earth Sciences.
GOODYEAR, WILLIAM F., Jr., New Brunswick, Chemistry.
GREENLEAF, NEWCOMB,[1] Short Hills, Mathematics.
HEARST, JOHN E., East Orange, Chemistry.
HESS, GEORGE B.,[1] Princeton, Physics.
KAY, ELIZABETH M., Leonia, Earth Sciences.
KING, CARY J., III,[1] Princeton, Engineering.
KLAUDER, LOUIS T., Jr., Moorestown, Physics.
LAIDLAW, WILLIAM J., Fair Lawn, Psychology.
LARSEN, DAVID, Hawthorne, Physics.
LISSNER, DAVID, Upper Montclair, Mathematics.
MARIK, ROBERT H.,[1] Westfield, Engineering.
MATHER, WILLIAM B., Jr., Princeton, Chemistry.
MCLEAN, MARGARET C., Glen Ridge, Zoology.
MEANS, WINTHROP D., Summit, Earth Sciences.
MENNITT, PHILIP G., Bayville, Chemistry.
O'BRIEN, PAUL J., Haddonfield, Biochemistry.
RADOSKI, HENRY R.,[1] Jersey City, Physics.
REICHLE, WALTER T., Bloomfield, Chemistry.
RICHTER, WAYNE H., Leonia, Mathematics.
RICHIE, ROBERT W., Princeton, Mathematics.
RUSKIE, HOWARD E., Westwood, Chemistry.
SCHNITZER, HOWARD J., Newark, Physics.
SILVESTRI, ANTHONY J.,[1] Glassboro, Chemistry.
TRETIAK, OLEH J., Passaic, Engineering.
VANDER VEN, NED S., Princeton, Physics.
VAN ZANDT, LONNIE L.,[1] Plainfield, Physics.
VAUGHAN, WORTH E., Tenafly, Chemistry.
WALDRON, SIDNEY R., Ringwood, Anthropology.
WAXMAN, NAHUM J.,[1] Vineland, Anthropology.
WEISBERG, ROBERT A., Bayonne, Microbiology.
WESNER, JOHN W., Jr., Berkeley Heights, Engineering.
WEYMAN, RAY J., Princeton, Astronomy.

Postdoctoral

KLEITMAN, DANIEL J., Morristown, Physics.
LEMAL, DAVID M., Fanwood, Chemistry.
PHILLIPS, JAMES C., Morristown, Physics.
SHUSTER, CHARLES W., Glen Rock, Biochemistry.
WAITE, THOMAS R., Morristown, Physics.

Senior Postdoctoral

GILLISPIE, CHARLES C., Princeton, History of Science.
KULP, J. LAURENCE, Demarest, Chemistry.
RAUCH, HARRY E., Trenton, Mathematics.

Science Faculty

GREENSPAN, BERNARD, Florham Park, Mathematics.
IMBRIE, JOHN, Leonia, Earth Sciences.
STIVALA, SALVATORE S., Merchantville, Chemistry.

NEW MEXICO

Predoctoral

COOPER, JAMES A.,[1] Albuquerque, Engineering.
PIERCE, ALLAN D., Las Cruces, Physics.
SWAIN, GEORGE R., Albuquerque, Engineering.

NEW YORK

Predoctoral

ADELBERG, ARNOLD M., Brooklyn, Mathematics.
ALCALAY, DAVID, New York, Mathematics.
ANDERSON, CHARLES H., Briarcliff Manor, Physics.

[1] Declined

BAUER, VICTOR J., White Plains, Chemistry.
BAUM, PAUL F., New York, Mathematics.
BENICE, RONALD J., Buffalo, Mathematics.
BERSOHN, MALCOLM, New York, Chemistry.
BLOOM, DAVID M., New York, Mathematics.
BOCK, WALTER, Woodhaven, Zoology.
BOIKESS, ROBERT S., Brooklyn, Chemistry.
BOLGER, JUSTIN C., Brooklyn, Engineering.
BRAY, RICHARD C., New York, Biochemistry.
BRUMER, ARMAND, Brooklyn, Mathematics.
BUHRER, CARL F., Hempstead, Chemistry.
BUTENSKY, MARTIN, Brooklyn, Engineering.
BUXBAUM, PAUL J.,[1] Flushing, Engineering.
CARROLL, ALAN S., Rochester, Physics.
CATANIA, A. CHARLES, New York, Psychology.
CHINOWSKY, STANLEY, Brooklyn, Engineering.
CLOUGH, GARRETT C., Newburgh, Zoology.
COLLA, COLEMAN, Buffalo, Engineering.
CONSIDINE, JAMES P., New York, Chemistry.
DAWSON, ROBERT L., Rochester, Chemistry.
DE PILLIS, JOHN, Jamaica, Mathematics.
DE VOE, HOWARD, Pleasantville, Chemistry.
DICK, STANLEY, Brooklyn, Botany.
DITTNER, PETER F., Long Island City, Physics.
DOLEN, RICHARD,[1] New York, Physics.
DOLLIVER, JAMES S.,[1] Ithaca, Botany.
DOUGHERTY, HARRY W., Brooklyn, Biochemistry.
DUBNAU, DAVID,[1] Brooklyn, Zoology.
DWORIN, LOWELL, Brooklyn, Physics.
ECKERT, ROGER O., New York, Zoology.
EICHBERG, JOSEPH, Jr., Great Neck, Medical Sciences.
EISENBERG, JUDAH, Forest Hills, Physics.
ERWIN, JOSEPH A., Brooklyn, Zoology.
FAGAN, JOHN J., Ridgewood, Earth Sciences.
FALB, PETER L., Brooklyn, Mathematics.
FARLEY, DONALD T., Jr.,[1] Ithaca, Physics.
FEHLNER, FRANCIS P., Dolgeville, Chemistry.
FEINLEIB, JULIUS,[1] Brooklyn, Physics.
FELDMAN, MARTIN, New York, Chemistry.
FELDMAN, MARTIN, Brooklyn, Physics.
FELDMAN, MARVIN, Brooklyn, Engineering.
FERZIGER, JOEL H., Brooklyn, Engineering.
FLINT, OLIVER S., Jr., Slaterville Springs, Zoology.
FRANCO, VICTOR, New York, Physics.
FRANKEL, RICHARD A.,[1] New York, Chemistry.
FREED, JACK,[1] Brooklyn, Engineering.
FUDGE, MOLLY W., Manlius, Zoology.
GALLANT, JONATHAN, Mount Vernon, Biochemistry.
GARDINER, WILLIAM, Niagara Falls, Chemistry.
GASSNER, HENRY P.,[1] Staten Island, Mathematical Economics.
GASTWIRTH, JOSEPH L.,[1] Rego Park, Mathematics.
GELB, ARTHUR, Brooklyn, Engineering.
GERSTEIN, IRA, Rego Park, Physics.
GIBBS, JAMES L., Jr., Ithaca, Anthropology.
GILINSKY, VICTOR, Bronx, Physics.
GLUCK, HERMAN R.,[1] New York, Mathematics.
GOLDBERG, ABRAHAM, Staten Island, Physics.
GOLDMAN, MICHAEL A.,[1] Brooklyn, Physics.
GOLDSTEIN, PAUL, Brooklyn, Chemistry.
GROSSMAN, EDWARD J., Brooklyn, Biochemistry.
GRUHN, RUTH, Cornwall on Hudson, Anthropology.
HALL, DANIEL N., Bronxville, Chemistry.
HARRINGTON, DAVID R., North Tonawanda, Physics.
HARRIS, MORTON E.,[1] Brooklyn, Mathematics.
HARTE, KENNETH J., Troy, Physics.
HERZBERG, NORMAN P.,[1] Brooklyn, Mathematics.
HOFF, MARCIAN E., Jr., Rochester, Engineering.
HOFFMANN, ROALD,[1] Jackson Heights, Chemistry.
HORING, NORMAN J., Brooklyn, Physics.
HOROWITZ, EDWIN B., Jamaica, Biophysics.
HORTMANN, ALFRED G., Woodside, Chemistry.
HRITZ, JANE M., Hornell, Chemistry.
HUGHES, THOMAS H.,[1] Mt. Kisco, Engineering.
JOHNSGARD, PAUL A., Ithaca, Zoology.
KADANOFF, LEO, New York, Physics.
KAHN, DANIEL S., Brooklyn, Mathematics.
KAISER, ROBERT, New York, Engineering.
KANDALL, GEOFFREY A.,[1] Far Rockaway, Mathematics.
KANDEL, ROBERT S.,[1] New York, Astronomy.
KAPLAN, STANLEY,[1] Brooklyn, Mathematics.
KARG, GERHART, New York, Chemistry.
KARRASS, ABRAHAM, Brooklyn, Mathematics.
KATZ, THOMAS, Forest Hills, Chemistry.
KESSLER, DIETRICH, Hamilton, Microbiology.
KNEUER, JOSEPH G.,[1] Massapequa, Engineering.
KORENMAN, VICTOR, Brooklyn, Physics.
LAMBERT, LORETTA, North Bellmore, Medical Sciences.
LANDE, ALEXANDER, New York, Physics.
LANDSMAN, EMANUEL, New York, Engineering.
LARCHAR, ROBERT H., New York, History of Science.
LARRABEE, ALLAN R., Great Neck, Biochemistry.
LEERMAKERS, PETER, Rochester, Chemistry.
LEIBOWITZ, GERALD M., New York, Mathematics.
LENT, ARNOLD, New York, Engineering.
LEVIEN, ROGER E., Brooklyn, Engineering.
LEVINE, IRA N., Brooklyn, Chemistry.
LEVINE, ISAAC, New York, Chemistry.
LEVINE, JEROME P., Mount Vernon, Mathematics.
LEVY, PETER M., New York, Engineering.
LIGHT, JOHN C., Mount Vernon, Chemistry.
LONGOSZ, EDWARD J., Rochester, Chemistry.
LUBIN, JONATHAN D., Staten Island, Mathematics.
MAGE, ROSE G., New York, Microbiology.
MARCUS, DANIEL H., Forest Hills, Engineering.
MARVIN, DONALD A., Ossining, Biophysics.
MAYER, ALAN, Flushing, Mathematics.
MCCABE, JOHN P., New York, Mathematics.
MCLEOD, DONALD W., Rochester, Physics.
MELTZER, HERBERT,[1] Brooklyn, Chemistry.
MENES, JACK, Flushing, Engineering.
MEYER, STUART L., New York, Physics.
MILLER, RICHARD W., Buffalo, Biochemistry.
MINEKA, JOHN, Ithaca, Mathematics.
MINKUS, JEROME, Brooklyn, Mathematics.
MONSKY, PAUL, Queens, Mathematics.
MOSHER, ROBERT E.,[1] Larchmont, Mathematics.
MYERS, ROBERT A., Mount Vernon, Physics.
NILSSON, WILLIAM, Middle Village, Chemistry.
NORDLANDER, J. ERIC, Schenectady, Chemistry.
NOVIN, DONALD, Brooklyn, Psychology.
O'DONNELL, DAVID V.,[1] Bellerose, Chemistry.
OLSEN, MARY J., Northport, Genetics.
OSOFSKY, ABRAHAM J., Cheektowaga, Engineering.

[1] Declined.

PAOLILLO, DOMINICK J., Jr., Delhi, Botany.
PESKOFF, ARTHUR, Jamaica, Engineering.
PHINNEY, ROBERT A., Rochester, Earth Sciences.
PIERSON, EDWARD S., Syracuse, Engineering.
PLATEK, WALTER A., Buffalo, Chemistry.
POULSON, THOMAS L., Manhasset, Zoology.
PRICE, STEVEN, Valley Stream, Zoology.
RAFF, ALFRED I.,[1] Brooklyn, Engineering.
RAPPAPORT, RHODA, New York, History of Science.
RICHTER, ALAN, Brooklyn, Genetics.
RIND, KENNETH, Brooklyn, Chemistry.
RINDE, JOHN J., New York, Engineering.
ROMBERG, BERNHARD W., Rochester, Mathematics.
SACKS, GERALD E., Ithaca, Mathematics.
SALZMAN, ALICE, Bronx, Chemistry.
SANDY, FRANK, New York, Physics.
SCADUTO, FLORENCE C., Seaford, Chemistry.
SCHEELE, GEORGE F., Yonkers, Engineering.
SCHEINBAUM, MONTE L., Brooklyn, Chemistry.
SCHILDKRAUT, CARL, Woodmere, Chemistry.
SCHRIER, EUGENE E., Flushing, Chemistry.
SCHULT, ROY L., Geneva, Physics.
SCHULTZ, JONAS, Brooklyn, Physics.
SCHUSTER, DAVID I., Cedarhurst, Chemistry.
SCHWEITZER, PAUL A., Pelham, Mathematics.
SEECOF, ROBERT, New York, Genetics.
SHAKIN, CARL, New York, Physics.
SHAPIRO, ELLEN,[1] New York, Mathematics.
SHAPIRO, ROBERT, New York, Chemistry.
SHAW, ROGER W., Buffalo, Physics.
SHEPP, LAWRENCE, Brooklyn, Mathematics.
SHURE, FRED C., New York, Physics.
SILVERT, WILLIAM,[1] New York, Physics.
SKLAR, LAWRENCE,[1] Laurelton, Physics.
SMITH, DAVID Y., Schenectady, Physics.
SOVERS, OJARS, Brooklyn, Physics.
STAFFORD, FRED E., Bronx, Chemistry.
STARK, GEORGE R., New York, Biochemistry.
STERNBERG, SAUL H.,[1] Bronx, Mathematical Psychology.
STERNHEIM, MORTON M., New York, Physics.
STEWART, DARYL G., Ithaca, Agriculture.
STRAUSS, HERBERT L., Kew Gardens, Chemistry.
STRAUSS, WALTER A., Kew Gardens, Mathematics.
TAYLOR, TEKLA, New York, Mathematics.
TEIGER, MARTIN L.,[1] Brooklyn, Physics.
THOMPSON, PHILIP A., Berlin, Engineering.
THORNDIKE, EDWARD H., Montrose, Physics.
TOBIAS, IRWIN, Brooklyn, Chemistry.
TUITE, ROBERT J., Rochester, Chemistry.
VINCOW, GERSHON, Brooklyn, Chemistry.
VOGEL, JOSEPH L.,[1] Richmond Hill, Physics.
VOZICK, MICHAEL W., New York, Biochemistry.
WAHLIG, MICHAEL A., Woodside, Physics.
WALL, THEODORE T., New York, Chemistry.
WARNER, ROBERT E., Rochester, Physics.
WATSON, GEORGE E., III, New York, Zoology.
WEBB, JULIAN P., Rochester, Physics.
WEHN, DONALD, Brooklyn, Mathematics.
WEININGER, STEPHEN, Whitestone, Chemistry.
WHINSTON, ANDREW, Flushing, Mathematical Economics.
WIMMER, GERTRUDE, New York, Botany.
WORTIS, MICHAEL,[1] New York, Physics.
WYTTENBACH, CHARLES R., Elmira, Zoology.
ZIPSER, DAVID,[1] New York, Botany.
ZWICKEL, ALLAN M., Lynbrook, Chemistry.

[1] Declined.

Postdoctoral

BRENNER, JOSEPH E., New York, Chemistry.
DUBINS, LESTER E., Bronx, Mathematics.
FEIT, WALTER, Ithaca, Mathematics.
GELLER, MURRAY, Brooklyn, Chemistry.
GLASHOW, SHELDON L., New York, Physics.
HIRSCH, MORRIS, New York, Mathematics.
JACOBSON, CLAIRE, New York, Anthropology.
JEPSEN, DONALD W., Niagara Falls, Chemistry.
KLEPPNER, DANIEL, New Rochelle, Physics.
KLOTZ, TILLA S., New York, Mathematics.
LUBKIN, ELIHU, Brooklyn, Physics.
MAZUR, PETER, New York, Zoology.
POPPER, JULIET, Brooklyn, Psychology.
SCHAEFER, JOHN P., Springfield Gardens, Chemistry.
SNYDER, JOAN, New York, Anthropology.
TAUSNER, MENASHA J., Bronx, Physics.
ULRICH, WERNER, New York, Engineering.

Senior Postdoctoral

GIBSON, JAMES J., Ithaca, Psychology.
MILLER, JULIAN M., New York, Chemistry.
SACHS, ALLAN M., Dobbs Ferry, Physics.
WOLFSBERG, MAX, Upton, Chemistry.

Science Faculty

BERNARD, FRANCIS J., New Rochelle, General Biology.
BOYD, ROBERT N., New York, Chemistry.
CARROLL, BENJAMIN, New York, Chemistry.
CHICCARELLI, JOSEPH B., New York, Mathematics.
COSTISICK, PAUL, Buffalo, General Biology.
CRIPPEN, FRANK B., New York, Mathematics.
HARRISON, WILLIAM P., Potsdam, Engineering.
HERREY, ERNA M. J., Flushing, Physics.
LENER, WALTER, Geneseo, General Biology.
LEVI, HOWARD, New York, Mathematics.
MATTERN, JOHN A., Buffalo, Chemistry.
NEWTON, ABBA V., Poughkeepsie, Mathematics.
PRYOR, MARVIN J., Coeymans, Physics.
SCHNELLER, MARY B., Brooklyn, General Biology.
WORTH, DONALD C., New York, Physics.

NORTH CAROLINA

Predoctoral

BRYANT, DAVID, Greensboro, Chemistry.
BURTON, ROBERT C., Chapel Hill, Mathematics.
HORNER, SALLY M., Chapel Hill, Chemistry.
JORDAN, WADE H., Jr., Edenton, Chemistry.
LINDSLEY, DONALD H., Asheville, Earth Sciences.
PETERSON, JAMES M., Clinton, Chemistry.
POSTMA, HERMAN, Wilmington, Physics.
ROSSER, GORDON H., Jr.,[1] Durham, Mathematics.
ROY, DONALD H., Raleigh, Engineering.
SNIPES, CHARLES A., Sylva, Zoology.
SNIPES, RAYMOND F., Reidsville, Chemistry.

Postdoctoral

STINESPRING, W. FORREST, Durham, Mathematics.

Senior Postdoctoral

NAYLOR, AUBREY W., Durham, Botany.
COX, EVELYN M., Greensboro, General Biology.

HAGOOD, JAMES J., Jr., Greensboro, Mathematics.
OWEN, HARRY A., Jr., Durham, Engineering.

NORTH DAKOTA

Postdoctoral

THOMAS, PAUL E., Fargo, Mathematics.

Science Faculty

ANDERSON, EDWIN M., Fargo, Engineering.
THOMPSON, JOHN C., Dickinson, Mathematics.

OHIO

Predoctoral

BAMBAKIDIS, GUST, Akron, Physics.
CARNAHAN, BRICE, New Philadelphia, Engineering.
CARRUTHERS, PETER A., Middletown, Physics.
CHRISTENSEN, JULIEN M., Dayton, Psychology.
CLARK, ALLAN H., Cincinnati, Mathematics.
CLARK, THOMAS J., St. Marys, Chemistry.
EK, FREDERICK L., Cuyahoga Falls, Physics.
ELDER, CAROL-ANN, Cleveland Heights, Botany.
ERNEST, JEANNETTE R., North Olmsted, Zoology.
FOOTE, J. LINDSLEY, Cleveland, Chemistry.
FROMMER, GABRIEL P., Cincinnati, Psychology.
HELLING, MARTIN, Canton, Mathematics.
HERSHMAN, ARNOLD, Cleveland Heights, Engineering.
HUFF, ROBERT W., Canton, Physics.
KOENIG, DONALD F., Cuyahoga Falls, Biophysics.
KRAMER, DAVID A., Cleveland, Physics.
KRAPP, PAUL J., Springfield, Chemistry.
KREIMER, H. FREDERICK, Jr., Cincinnati, Mathematics.
LEBOR, ANDREW S., Cincinnati, Physics.
LENHERT, P. GALEN, Arcanum, Biophysics.
MALONEY, WILLIAM T., Jr., Niles, Engineering.
MARSHALL, THOMAS C., Cleveland, Physics.
MAWBY, JOHN E., Dayton, Earth Sciences.
MERKL, ARTHUR W., Cincinnati, Chemistry.
NICHOLS, LARRY D., Xenia, Chemistry.
NICHOLS, THOMAS S., Batavia, Chemistry.
NORCROSS, BRUCE E., Columbus, Chemistry.
OGG, ANDREW P., Bowling Green, Mathematics.
POWELL, DAVID L., Mansfield, Chemistry.
RENKEN, JAMES H.,[1] Columbus, Physics.
ROSEN, RONALD H., Cleveland Heights, Mathematics.
SIMPSON, ANNA L., Oberlin, Psychology.
SLAYMAN, CLIFFORD L., Jr.,[1] Canton, Zoology.
SMALLWOOD, RICHARD D.,[1] Dayton, Engineering.
SWEENEY, THOMAS L.,[1] Cleveland, Engineering.
TAYLOR, LYNN, J., Cuyahoga Falls, Chemistry.
VON DER EMBSE, URBAN A., Kalida, Engineering.
YOUNG, ANDREW T., Massillon, Astronomy.

Postdoctoral

FREED, STANLEY A., Springfield, Anthropology.
GIRARDEAU, MARVIN D., Jr., Bay Village, Physics.
ROYCE, PAUL C., Cleveland, Medical Sciences.

Senior Postdoctoral

STAVITSKY, ABRAM B., Euclid, Medical Sciences.

Science Faculty

ACKER, GEORGE G., Bowling Green, Chemistry.
ANDERS, HANNS K., Bowling Green, Chemistry.
ARMITAGE, KENNETH B., Steubenville, Zoology.
BEAL, JACK L., Columbus, Biochemistry.
BURLAGE, HENRY, Jr., Cleveland Heights, Engineering.
DAVIS, RICHARD C., Akron, Mathematics.
EICHEN, ERWIN, Columbus, Engineering.
FINKBEINER, DANIEL T., II, Gambier, Mathematics.
FRAZIER, THYRSA A., Wilberforce, Mathematics.
GLASOE, PAUL K., Springfield, Chemistry.
GOTTSCHANG, JACK L., Cincinnati, Zoology.
LESSLER, MILTON A., Columbus, Zoology.
NAVE, FLOYD R., Springfield, Earth Sciences.
PARK, GEORGE K., Athens, Anthropology.
QUISENBERRY, ROGER C., Athens, Engineering.
STOLL, ROBERT R., Oberlin, Mathematics.
YOZWIAK, BERNARD J., Youngstown, Mathematics.

OKLAHOMA

Predoctoral

DENISON, GILBERT W., Norman, Engineering.
ENGLEMAN, MARK,[1] Woodward, Botany.
FRETWELL, LYMAN J., Jr., Tulsa, Physics.
KRUGER, CHARLES H., Oklahoma City, Engineering.
LAND, HUGH C., Norman, Zoology.
PARKER, JERALD D., Stillwater, Engineering.
SCHMALBERGER, DONALD C., Stillwater, Astronomy.

Science Faculty

BLEAKLEY, WILLIAM B.,[1] Tulsa, Engineering.
WALLER, EDWIN J., Stillwater, Engineering.

OREGON

Predoctoral

AMMANN, EUGENE O., Portland, Engineering.
COLE, GLEN H., Portland, Anthropology.
DE BAR, ROGER B., Eugene, Physics.
DIXON, RICHARD W.,[1] Woodburn, Engineering.
GOSE, EARL E., Portland, Engineering.
KIND, PHYLLIS D., Portland, Microbiology.
KUEHL, LEROY, Corvallis, Biochemistry.
LEEPER, EDWARD, Eugene, Physics.
MOURSUND, DAVID G.,[1] Eugene, Mathematics.
NEWTON, RICHARD M., Corvallis, Biochemistry.
OHLSEN, GERALD G., Eugene, Physics.
PERSON, JAMES C., Salem, Chemistry.
RUSSELL, DALE A., Enterprise, Earth Sciences.

Postdoctoral

STROMBERG, KARL R., Troutdale, Mathematics.

[1] Declined.

Science Faculty

KLEINHOLZ, LEWIS H., Portland, Zoology.

PENNSYLVANIA

Predoctoral

AARON, RONALD, Philadelphia, Physics.
ANDERSON, ANSEL C., North Warren, Physics.
BERMON, STUART, Philadelphia, Physics.
BERTRAM, WALTER J., Jr., Pittsburgh, Physics.
BIDWELL, LEONARD N., Philadelphia, Mathematics.
BLUMENTHAL, SAUL, Philadelphia, Engineering.
BODOIA, JOHN, Pittsburgh, Engineering.
BOHACHEVSKY, IHOR O., Philadelphia, Mathematics.
BRICE, MARTHA C., Glenside, Zoology.
BURGIN, WALTER H., Jr., Camp Hill, Mathematics.
BURTNER, ROGER L., Hershey, Earth Sciences.
COX, DAVID J., Swarthmore, Biochemistry.
COX, WALTER M., Glenside, Earth Sciences.
DAVIES, K. THOMAS R., Pittsburgh, Physics.
DE COURSEY, PATRICIA J., Paoli, Zoology.
DELANEY, THOMAS J., Havertown, Engineering.
EARDLEY, DAVID B., Pittsburgh, Engineering.
EARLE, CLIFFORD, Jr., Abington, Mathematics.
EVANS, DAVID W., Erie, Agriculture.
EYDE, RICHARD H., Lancaster, Botany.
FANTE, RONALD L., Philadelphia, Engineering.
FLEMING, GORDON N.,[1] Pittsburgh, Physics.
FLIEGEL, HENRY F., Havertown, Astronomy.
FRENCH, THAYER C., Sewickley, Biochemistry.
GOODRICH, ROBERT L., Pittsburgh, Physics.
GREEN, JOHN P., Jr., Philadelphia, Engineering.
GRENDER, GORDON C., State College, Earth Sciences.
GRIM, SAMUEL O., Dallastown, Chemistry.
GROOM, DONALD E., Turtle Creek, Physics.
HALL, ROBERT D., Philadelphia, Psychology.
HATCH, THEODORE F., Jr., Pittsburgh, Mathematics.
HENDRIX, THOMAS E., Landisville, Earth Sciences.
HILL, E. ALEXANDER, III, Carnegie, Chemistry.
HIRSCHFIELD, JUDITH B., Pittsburgh, Mathematics.
HOHMANN, JERE W., Volant, Engineering.
JOHNS, LEWIS E., Jr., Pittsburgh, Engineering.
JONES, RICHARD H., Ridley Park, Engineering.
KAMPMEIER, JACK A., Wyncote, Chemistry.
KAUFFMAN, MARVIN E., Lancaster, Earth Sciences.
KAUFFMAN, JOEL M., Huntingdon Valley, Chemistry.
KRAMER, J. DAVID R., Jr., Philadelphia, Engineering.
LAISON, GARY, Philadelphia, Mathematics.
MCFADDEN, JAMES T., State College, Zoology.
MCNUTT, DOUGLAS P., Philadelphia, Physics.
MCWILLIAMS, IAN G., Philadelphia, Physics.
MAGID, LEONARD M., Philadelphia, Engineering.
MOLLENAUER, JAMES F., Radnor, Chemistry.
MORAN, PAUL R.,[1] Coudersport, Physics.
MORRISON, JAMES L., Pittsburgh, Physics.
OPSHELOR, VIRGINIA B.,[1] Philadelphia, Chemistry.
REILLY, BERNARD E., Conneaut Lake, Medical Sciences.
SARTORY, WALTER K., Pittsburgh, Engineering.
SEIDERS, VICTOR M., York, Earth Sciences.
SHAFFER, RUSSELL A., Philadelphia, Physics.
SHAW, LEONARD, Lafayette Hills, Engineering.
SHEPPARD, RICHARD A., Lancaster, Earth Sciences.
SILVERSTEIN, MARIANNE, Philadelphia, Mathematics.
SMITH, GEORGE E.,[1] Upper Darby, Physics.
SNYDER, EUGENE I., Philadelphia, Chemistry.
SQUIRES, ROBERT G., Ambridge, Engineering.
STEIN, FRED P., Dallastown, Engineering.
STONER, JOHN O., Jr., Berlin, Physics.
THOMSON, GEORGE H., Philadelphia, Chemistry.
THORNTON, H. FRANCIS, Philadelphia, Mathematics.
VAISNYS, JUOZAS R., Philadelphia, Chemistry.
VAN VALEN, LEIGH, Harrisburg, Zoology.
WELSH, ROBERT E., Pittsburgh, Physics.
WOOD, DON, Corry, Engineering.
WOODS, ROBERT M., Jr., New Wilmington, Physics.
ZARTMAN, ROBERT E., Lititz, Earth Sciences.

Postdoctoral

ALEXEFF, IGOR, Pittsburgh, Physics.
BRILL, ARTHUR S., Philadelphia, Biophysics.
COMFORT, W. WISTAR, Bryn Mawr, Mathematics.
GEFFEN, DONALD A., Pittsburgh, Physics.
KNOBLER, CAROLYN B., State College, Chemistry.
LINDENMAYER, ARISTID, Philadelphia, Logic & Biology
MUNSON, RONALD A., Lancaster, Chemistry.
PETERSON, DONALD B., Erie, Chemistry.
SAWYER, RAYMOND F., Bethlehem, Physics.
SORENSEN, RAYMOND A., Pittsburgh, Physics.
WINDGASSEN, RICHARD J., Jr., Allison Park, Chemistry.

Senior Postdoctoral

ASHKIN, JULIUS, Saxonburg, Physics.
BATES, THOMAS F., State College, Earth Sciences.
GERSTENHABER, MURRAY, Philadelphia, Mathematics.
KUHN, HAROLD W., Secane, Mathematical Economics.

Science Faculty

BEICHL, GEORGE J., Philadelphia, Chemistry.
BERATAN, LEON L., Philadelphia, Engineering.
BISSINGER, BARNARD H., Annville, Mathematics.
CRISLEY, FRANCIS D., Pittsburgh, Microbiology.
HARTZLER, EVA R., Belleville, Chemistry.
LEWIS, DOROTHY S., McDonald, Chemistry.
MILLER, BERNARD L., Havertown, Physics.
MORRILL, BERNARD, Swarthmore, Engineering.
NEE, M. COLEMAN, Scranton, Mathematics.
PARSONS, WILLIAM H., Meadville, Earth Sciences.

[1] Declined.

RHODE ISLAND

Predoctoral

BEAUDET, ROBERT A., Woonsocket, Chemistry.
BURTON, PAUL E., Warwick, Chemistry.
FLYNN, GEORGE P., Warren, Chemistry.
FREYD, PETER,[1] Providence, Mathematics.
JACOBS, NORMAN A.,[1] Providence, Engineering.
LEMAIRE, NORMAND A., Providence, Chemistry.
MOULTON, DAVID M., Providence, Chemistry.

Postdoctoral

EINSTEIN, JULIAN R., Providence, Medical Science.
GORDON, JOHN E., Providence, Chemistry.

Science Faculty

CLAPP, LEALLYN B., Providence, Chemistry.
FERRANTE, WILLIAM R., Providence, Engineering.

SOUTH CAROLINA

Predoctoral

KING, HAROLYN, Marion, Chemistry.

Science Faculty

ROACHE, LEWIE C., Orangeburg, General Biology.

SOUTH DAKOTA

Predoctoral

MACEK, ROBERT, Faulkton, Physics.
MINEHART, RALPH C., Mitchell, Physics.
PIERCE, ROBERT L., Huron, Mathematics.
RASMUSSON, GARY, Clark, Chemistry.

Science Faculty

ESSLER, WARREN O., Brookings, Engineering.

TENNESSEE

Predoctoral

COOK, CLARENCE E., Jefferson City, Chemistry.
HUMPHREYS, TOM D., Arlington, Zoology.
NUNNALLY, DAVID A., Memphis, Zoology.
REKEMEYER, MARY L., Oak Ridge, Genetics.
WALLACE, WILLIAM J., Clinton, Chemistry.
WOODFIN, BEULAH M.,[1] Nashville, Biochemistry.

Postdoctoral

BLANKENBECLER, RICHARD, Kingsport, Physics.
COX, JAMES R., Jr., Cookeville, Chemistry.
MARTIN, MICHAEL M., Nashville, Chemistry.
SHIMONY, ABNER E., Memphis, Philosophy of Physics.

Science Faculty

SCHWEITZER, GEORGE K., Knoxville, Philosophy of Science.
SMITH, CHARLES H., Memphis, Chemistry.
WADDELL, HENRY T., Troy, Botany.

TEXAS

Predoctoral

ABBOTT, WALTER P., Austin, Zoology.
ANDERSON, LOUIS W., Houston, Physics.
ARONS, HOWARD L., Dallas, Chemistry.
ASHBY, NEIL, Dalhart, Physics.
BAKER, WILLIE A., Jr., Austin, Chemistry.
BECHTEL, NORBERT G., Jr., Groves, Engineering.
BLAND, RICHARD P., Farmersville, Mathematics.
BRANS, CARL H., Jr., Dallas, Physics.
COLE, DAVID, Brownwood, Chemistry.
COLGATE, SAM O., Amarillo, Chemistry.
DAHM, DAVID M., Dallas, Physics.
GROSS, MEREDITH G., Jr., Amarillo, Earth Sciences.
HARRIS, DONALD P., Austin, Engineering.
HYDER, MONTE L., Rockdale, Chemistry.
JONES, BENJAMIN F., Houston, Engineering.
LESIKAR, ARNOLD V., Houston, Physics.
LOWE, MILDRED E., Galveston, Zoology.
LOWRY, JOHN T., Jr., Laredo, Biophysics.
MANUEL, THOMAS A., Austin, Chemistry.
MONGER, JOANNE, Beaumont, Mathematics.
OSBORNE, ZACK, Pampa, Physics.
PECK, CHARLES W., Freer, Physics.
ROBERTS, LARRY S., Dallas, Zoology.
STREETER, STEPHEN, Houston, Earth Sciences.
STUBBLEFIELD, TRAVIS E., Denton, Medical Sciences.
WEIR, MORTON W., Austin, Psychology.
WILSON, ROBERT W., Houston, Physics.
WISDOM, NORVELL E., Jr., Crane, Chemistry.

Postdoctoral

OVERALL, JOHN E., Austin, Psychology.

Science Faculty

ANDERSON, MILES E., Denton, Physics.
CARAWAY, PRENTICE A., Stephenville, Zoology.
HAMMOND, MELVIN A. R., Austin, Natural Sciences General.
HENDERSON, LAVANIEL L., Sr., Washington, Botany.
LA ROE, RACHAEL A., Terrell, Mathematics.
LANDEGREN, GUSTALF F., Beaumont, Physics.
NORRIS, WILLIAM E., Jr., San Marcos, Botany.
NOYES, THEODORE A., Bryan, Engineering.
TERWEY, PETER, Jr., Beaumont, Mathematics.
VINCENT, LLOYD D., Baytown, Physics.
YOUNG, PHILLIP L., Nacogdoches, Zoology.

UTAH

Predoctoral

ANDERSON, LORAN C., Logan, Botany.
BERGESON, HAVEN E., Salt Lake City, Physics.
BILLS, JAMES L.,[1] Salt Lake City, Chemistry.
EVERETT, GLEN E., St. George, Physics.
ISRAELSEN, BOYD P., Logan, Engineering.
MUIRBROOK, NEWELL K.,[1] Ogden, Engineering.
PARKER, PIERCE D., Salt Lake City, Earth Sciences.
PICKERING, RANARD J., Orem, Earth Sciences.
PINCOCK, RICHARD E., Ogden, Chemistry.
ROSS, KENNETH A., Salt Lake City, Mathematics.
RUNNELLS, DONALD D., Salt Lake City, Earth Sciences.
SHAW, ALAN W., Brigham, Engineering.
SIMMONS, JOHN R., Logan, Biochemistry.

[1] Declined.

Science Faculty

BAGLEY, JAY MERRILL, Logan, Engineering.
BAHLER, THOMAS L., Logan, Medical Sciences.
LARSEN, WESLEY P., Salt Lake City, Zoology.
TRUJILLO, ALFONSO R., Price, Chemistry.

VERMONT

Predoctoral

FINEMAN, JOSEPH C.,[1] Shaftsbury, Physics.
SMITH, DOUGLAS L., Marshfield, Chemistry.

Science Faculty

INSKEEP, RICHARD G., Burlington, Chemistry.
TORCH, REUBEN, Burlington, Zoology.

VIRGINIA

Predoctoral

ADAMS, J. BARCLAY, Charlottesville, Physics.
ANDERSON, MARY M., Arlington, Chemistry.
BOBERG, THOMAS C., Falls Church, Engineering.
COLEMAN, SAMUEL H., Roanoke, Mathematics.
EANES, EDWARD D., Williamsburg, Chemistry.
GARRICK, MICHAEL D., Hampton, Biochemistry.
GRISWOLD, RALPH E., Arlington, Engineering.
HALEY, JOSEPH A., Ashland, Mathematics.
HANSON, CHARLES L., Alexandria, Zoology.
HEATWOLE, HAROLD F., Waynesboro, Zoology.
JOLLY, H. PAUL, Jr.,[1] Richmond, Physics.
KONRAD, MICHAEL,[1] Virginia Beach, Biophysics.
LIGHT, ROBLEY J., Roanoke, Chemistry.
MALMAR, CONSTANCE M.,[1] Rapidan, Chemistry.
MURRAY, J. JAMES, Jr., Lexington, Zoology.
NORTHROP, RALPH C., Jr., Arlington, Chemistry.
PENNISTON, JOHN T., Fairfax, Biochemistry.
STARNES, WILLIAM H., Jr., Ewing, Chemistry.
TERBORGH, JOHN W., Arlington, Zoology.
THOMAS, WILLIAM A., Blacksburg, Earth Sciences.
WAMPLER, JESSE M., Linville, Earth Sciences.

Postdoctoral

ZUCHELLI, A. JOSEPH, Jr., Charlottesville, Physics.

Science Faculty

MONCURE, HENRY, Jr.,[1] Charlottesville, Chemistry.
WALL, ARTHUR A., Portsmouth, Chemistry.

WASHINGTON

Predoctoral

BIRKELAND, PETER W., Bellevue, Earth Sciences.
BROWN, RONALD E., Everett, Physics.
BUCHANAN, CHARLES D., Steilacoom, Physics.
BURK, HAROLD W., Tacoma, Psychology.
CHANG, DAVID B., Seattle, Physics.
COLE, DALE W., Seattle, Agriculture.
CRAVEN, JAMES M., Seattle, Chemistry.
EVANS, ROBERT J., Seattle, Chemistry.
FIDDLER, RICHARD W.,[1] Kirkland, Engineering.
FLUHARTY, ARVAN L., Seattle, Biochemistry.
GUARD, JAMES R.,[1] Seattle, Mathematics.
HELLIWELL, THOMAS M., Kirkland, Physics.
HILLIER, FREDERICK S.,[1] Aberdeen, Engineering.
KNUDSEN, JANICE M., Walla Walla, Medical Sciences.
LEPSE, PAUL, Seattle, Chemistry.
LINSTROM, CAROL J., Tacoma, Microbiology.
McIVOR, IVOR K., Kirkland, Engineering.
McNEILL, DALE, Tacoma, Physics.
MERCHANT, HOWARD C., Bothell, Engineering.
MOTTELER, ZANE C.,[1] Olympia, Mathematics.
ROE, DAVID K., Tacoma, Chemistry.
RUPLEY, JOHN A., Seattle, Biochemistry.
SAGLE, ARTHUR A., Seattle, Mathematics.
SEEDS, ROBERT B., Vancouver, Engineering.
TONKYN, RICHARD G., Seattle, Chemistry.
YOWELL, CAROL E., Seattle, Physics.

Postdoctoral

BLANK, H. RICHARD, Jr., Seattle, Earth Sciences.
HARMON, KENNETH M., Seattle, Chemistry.
HUGHES, DANIEL R., Bothell, Mathematics.
PHELPS, ROBERT R., Seattle, Mathematics.
WILCOX, WESLEY C., Seattle, Medical Sciences.

Senior Postdoctoral

FLEAGLE, ROBERT G., Seattle, Earth Sciences.
HENLEY, ERNEST M., Seattle, Physics.

Science Faculty

CANARIS, ALBERT G., Everett, Zoology.
CARLSON, DALE A., Aberdeen, Engineering.
COATES, VINCENT L., Centralia, Mathematics.

WEST VIRGINIA

Predoctoral

BURDICK, DONALD S., Huntington, Mathematics.
FRAME, ROBERT A., Jr., Charleston, Chemistry.

Science Faculty

DUKE, JOSEPH A., Wheeling, Chemistry.
PAINTER, JACK T., Kingston, Engineering.

WISCONSIN

Predoctoral

AITKEN, DONALD W., Jr., Madison, Physics.
BUSHNELL, WILLIAM R., Madison, Botany.
FRAUTSCHI, STEVEN, Madison, Physics.
HABERSTROH, ROBERT A., Wauwatosa, Physics.
HARTMAN, THOMAS F., Oshkosh, Psychology.
HENSEL, GUSTAV, Sheboygan, Mathematics.
HOUGEN, JON T., Sheboygan, Chemistry.
HUNDHAUSEN, ARTHUR J., Wausau, Physics.
JACOB, RICHARD, Ripon, Physics.
JONES, EVAN T., Madison, Chemistry.
KADLEC, ROBERT, Racine, Engineering.
LAUDON, RICHARD B., Waunakee, Earth Sciences.
MAKOUS, WALTER,[1] Wauwatosa, Psychology.
MARDEN, ALBERT, Milwaukee, Mathematics.
MEYER, RICHARD T., Madison, Chemistry.

[1] Declined.

MILLER, GERALD R., Milwaukee, Chemistry.
OETZEL, GEORGE N., Beloit, Engineering.
PARKER, DAVID J., Madison, Chemistry.
PETERSON, LAURENCE, River Falls, Physics.
PFEFFERKORN, ELMER R., Manitowoc, Medical Sciences.
POMRANING, GERALD C., Oshkosh, Engineering.
REESE, WILLIAM,[1] Bellevue, Physics.
ROESLER, FRED L., Wauwatosa, Physics.
SCHWARTZ, RICHARD J., Waukesha, Engineering.
SHARP, TERRY E., La Crosse, Chemistry.
SIMPSON, JAMES E., Milwaukee, Mathematics.
STEIGELMANN, EDWARD F., Milwaukee, Chemistry.
SUTTON, PAUL W., Sparta, Chemistry.
TOBEY, STEPHEN W., Madison, Chemistry.
TREICHEL, PAUL M., Jr., Madison, Chemistry.
WRIGHT, CHARLES R. B., Madison, Mathematics.
ZIEGLER, JUDITH A., Eau Claire, Psychology.

Senior Postdoctoral

FERRY, JOHN D., Madison, Chemistry.

Science Faculty

FEIEREISEN, WILLIAM J., Madison, Engineering.
FELDBALLE, M. ELAINE, Madison, Zoology.
LOY, WAYNE R., Plattsville, Chemistry.
MATAR, JOSEPH E., Milwaukee, Engineering.
WARNER, ELDON D., Wauwatosa, Zoology.

[1] Declined.

WYOMING

Predoctoral

BUCKINGHAM, WILLIAM J., Kemmerrer, Mathematics.
HENDERSHOTT, MYRL C.,[1] Lander, Physics.
KLEINDIENST, MAXINE R., Superior, Anthropology.
TALBERT, WILLARD L., Jr., Casper, Physics.

ALASKA

Science Faculty

HOSKINS, JOHN R., College, Engineering.
RICE, ELBERT F., Jr., College, Engineering.

HAWAII

Predoctoral

FURUMOTO, AUGUSTINE S., Honolulu, Earth Sciences.
IZUNO, TAKUMI, Wahiawa, Genetics.

Science Faculty

FRODYMA, MICHAEL M., Honolulu, Chemistry.

PUERTO RICO

Predoctoral

LEVINS, RICHARD, Yauco, Genetics.

Science Faculty

PICO-BAUERMEISTER, CARMEN A., Santurce, Mathematics.

Institutions Chosen By NSF Predoctoral Fellows

	Fellows
Alabama, University of, University, Ala	2
Arizona, University of, Tucson, Ariz	1
Arkansas, University of, Fayetteville, Ark	2
Brooklyn Polytechnic Institute of, Brooklyn, N. Y	2
Brown University, Providence, R. I	6
Buffalo, University of, Buffalo, N. Y	1
California Institute of Technology, Pasadena, Calif	65
California, University of, Berkeley, Calif	68
California, University of, Davis, Calif	1
California, University of, Los Angeles, Calif	16
California University of Southern, Los Angeles, Calif	1
Carnegie Institute of Technology, Pittsburgh, Pa	13
Case Institute of Technology, Cleveland, Ohio	1
Chicago, University of, Chicago, Ill	50
Colorado School of Mines, Golden, Colo	1
Colorado State University, Fort Collins, Colo	1
Colorado, University of, Boulder, Colo	4
Columbia University, New York, N. Y	30
Cornell University, Ithaca, N. Y	24
Dartmouth College, Hanover, N. H	1
Delaware, University of, Newark, Del	2
Duke University, Durham, N. C	6
Florida State University, Tallahassee, Fla	4
Fordham University, New York, N. Y	1
Georgia Institute of Technology, Atlanta, Ga	2
Harvard University, Cambridge, Mass	129
Idaho, University of, Moscow, Idaho	1
Illinois Institute of Technology, Chicago, Ill	1
Illinois, University of, Urbana, Ill	29
Indiana University, Bloomington, Ind	5
Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa	4
Iowa, State University of, Iowa City, Iowa	8
Johns Hopkins University, Baltimore, Md	17
Kansas State College of Agriculture and Applied Science, Manhattan, Kans	1
Kansas, University of, Lawrence, Kans	6
Kentucky, University of, Lexington, Ky	1
Lehigh University, Bethlehem, Pa	1
Loyola University, Chicago, Ill	1
Maryland, University of, College Park, Md	3
Massachusetts Institute of Technology, Cambridge, Mass	84
Michigan State University of Agriculture and Applied Science, East Lansing, Mich	5
Michigan, University of, Ann Arbor, Mich	28
Minnesota, University of, Minneapolis, Minn	14
Montana State University, Missoula, Mont	1
Nebraska, University of, Lincoln, Nebr	1

	Fellows
New Hampshire, University of, Durham, N. H	1
New York University, New York, N. Y	4
North Carolina State College of Agriculture and Engineering, Raleigh, N. C	1
North Carolina, University of, Chapel Hill, N. C	6
Northwestern University, Evanston, Ill	7
Notre Dame, University of, Notre Dame, Ind	1
Ohio State University, Columbus, Ohio	6
Oklahoma, University of, Norman, Okla	4
Oregon State College, Corvallis, Oreg	1
Pennsylvania, University of, Philadelphia, Pa	6
Pennsylvania State University, University Park, Pa	4
Princeton University, Princeton, N. J	52
Purdue University, Lafayette, Ind	4
Radcliffe College, Cambridge, Mass	10
Rensselaer Polytechnic Institute, Troy, N. Y	3
Rice Institute, Houston, Tex	3
Rochester, University of, Rochester, N. Y	5
Rutgers, The State University, New Brunswick, N. J	1
St. Louis University, St. Louis, Mo	2
South Carolina, University of, Columbia, S. C	1
Stanford University, Stanford, Calif	45
Stevens Institute of Technology, Hoboken, N. J	1
Syracuse University, Syracuse, N. Y	1
Tennessee, University of, Knoxville, Tenn	1
Texas, University of, Austin, Tex	8
Tufts University, Medford, Mass	1
Tulane University of Louisiana, New Orleans, La	1
Utah State University of Agriculture and Applied Science, Logan, Utah	1
Utah, University of, Salt Lake City, Utah	2
Vanderbilt University, Nashville, Tenn	1
Virginia Polytechnic Institute, Blacksburg, Va	1
Virginia, University of, Charlottesville, Va	2
Washington University, St. Louis, Mo	7
Washington, University of, Seattle, Wash	10
Wayne State University, Detroit, Mich	1
Western Reserve University, Cleveland, Ohio	1
Wisconsin, University of, Madison, Wis	47
Yale University, New Haven, Conn	31
Foreign Institutions	
Birmingham, University of, Birmingham, England	1
Bristol, University of, Bristol, England	1
Cambridge, University of, Cambridge, England	2
Goettingen, University of, Goettingen, Germany	1
Kyoto University, Kyoto, Japan	1
London, University of, London, England	1
Oxford, University of, Oxford, England	4
Paris, University of, Paris, France	2
Stockholm, University of, Stockholm, Sweden	1
Swiss Federal Institute of Technology, Zurich, Switzerland	1

Present or Most Recent Institutional Affiliation of Individuals Offered National Science Foundation Postdoctoral and Science Faculty Fellowships

REGULAR POSTDOCTORAL	Fellows
California, University of, Berkeley, Calif	7
California, University of, Davis, Calif	8
California, University of, Los Angeles, Calif	8
California, University of, San Francisco, Calif	1
California Institute of Technology, Pasadena, Calif	3
Cambridge University, Cambridge, England	1
Carnegie Institute of Technology, Pittsburgh, Pa	3
Chicago, University of, Chicago, Ill	8
Colorado, University of, Boulder, Colo	1
Colorado State University, Fort Collins, Colo	1
Columbia University, New York, N. Y	4
Cornell University, Ithaca, N. Y	1
Duke University, Durham, N. C	1
Florida State University, Tallahassee, Fla	1
Harvard University, Cambridge, Mass	20
Illinois, University of, Urbana, Ill	9
Indiana University, Bloomington, Ind	4
Institute for Advanced Study, Princeton, N. J	1
Institute for Theoretical Physics, Copenhagen, Denmark	1
Iowa, State University of, Iowa City, Iowa	2
Johns Hopkins University, Baltimore, Md	3
Kansas, University of, Lawrence, Kans	1
Leeds, University of, Leeds, England	1
Massachusetts Institute of Technology, Cambridge, Mass	7
Michigan, University of, Ann Arbor, Mich	5
Minnesota, University of, Minneapolis, Minn	2
Nebraska, University of, Lincoln, Nebr	1
New York University, New York, N. Y	1
Northwestern University, Chicago, Ill	3
Ohio State University, Columbus, Ohio	1
Oregon, University of, Eugene, Oreg	1
Oxford, University of, Oxford, England	2
Pennsylvania, University of, Philadelphia, Pa	2
Pennsylvania State University, University Park, Pa	2
Pittsburgh, University of, Pittsburgh, Pa	1
Princeton University, Princeton, N. J	4
Purdue University, Lafayette, Ind	2
Radcliffe College, Cambridge, Mass	1
Rochester, University of, Rochester, N. Y	1
Stanford University, Stanford, Calif	2
Syracuse University, Syracuse, N. Y	1
Tennessee, University of, Knoxville, Tenn	1

	Fellows
Texas, University of, Austin, Tex	1
Virginia, University of, Charlottesville, Va	2
Washington, University of, Seattle, Wash	8
Washington University, St. Louis, Mo	1
Wayne State University, Detroit, Mich	1
Western Reserve University, Cleveland, Ohio	1
Wisconsin, University of, Madison, Wis	8
Yale University, New Haven, Conn	4

SENIOR POSTDOCTORAL

Air Force Cambridge Research Center, Cambridge, Mass	1
Argonne National Laboratory, Lemont, Ill	1
Brandeis University, Waltham, Mass	2
Brookhaven National Laboratory, Upton, Long Island, N. Y	1
Bryn Mawr College, Bryn Mawr, Pa	1
California, University of, Berkeley, Calif	6
California, University of, Davis, Calif	1
California, University of, Los Angeles, Calif	2
California, University of, San Francisco, Calif	1
California, University of, Santa Barbara, Calif	1
Carnegie Institute of Technology, Pittsburgh, Pa	1
Chicago, University of, Chicago, Ill	3
Clark University, Worcester, Mass	1
Colorado, University of, Boulder, Colo	1
Columbia University, New York, N. Y	3
Connecticut, University of, Storrs, Conn	1
Cornell University, Ithaca, N. Y	1
Duke University, Durham, N. C	1
Florida, University of, Gainesville, Fla	1
Idaho, University of, Moscow, Idaho	1
Illinois, University of, Urbana, Ill	1
Indiana University, Bloomington, Ind	3
Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa	2
Iowa, State University of, Iowa City, Iowa	2
Maryland, University of, College Park, Md	1
Massachusetts Institute of Technology, Cambridge, Mass	2
Michigan, University of, Ann Arbor, Mich	1
Missouri, University of, Columbia, Mo	1
National Institutes of Health, Bethesda, Md	2
New York University, New York, N. Y	1
Northwestern University, Evanston, Ill	1
Oregon, University of, Eugene, Oreg	1
Pennsylvania, University of, Philadelphia, Pa	1
Pennsylvania State University, University Park, Pa	2
Princeton University, Princeton, N. J	2
Rockefeller Institute, New York, N. Y	2
Smith College, Northampton, Mass	1
Southern California, University of, Los Angeles, Calif	1
Stanford University, Stanford, Calif	3
U. S. Department of Agriculture, Berkeley, Calif	1
U. S. Department of Agriculture, Orlando, Fla	1
U. S. Department of Agriculture, Manhattan, Kans	1
U. S. Naval Radiological Defense Laboratory, San Francisco, Calif	1
Utah State University of Agriculture and Applied Science, Logan, Utah	1
Virginia, University of, Charlottesville, Va	1
Walter Reed Army Research Institute, Washington, D. C	1
Washington, University of, Seattle, Wash	8
Washington University, St. Louis, Mo	1
Western Reserve University, Cleveland, Ohio	1
Wisconsin, University of, Madison, Wis	1
Woods Hole Marine Biological Laboratory, Woods Hole, Mass	1
Yale Medical School, New Haven, Conn	1

SCIENCE FACULTY

Akron, University of, Akron, Ohio	1
Alabama Polytechnic Institute, Auburn, Ala	2
Alaska, University of, College, Alaska	1
Albany State College, Albany, N. Y	1
Allegheny College, Meadville, Pa	1
American International College, Springfield, Mass	1
Arizona, University of, Tucson, Ariz	2
Arkansas Polytechnic College, Russellville, Ark	1
Barnard College, New York, N. Y	1
Boston College, Chestnut Hill, Mass	1
Boston University, Boston, Mass	1
Bowling Green State University, Bowling Green, Ohio	2
Brown University, Providence, R. I	1
Bucknell University, Lewisburg, Pa	1
Buena Vista College, Storm Lake, Iowa	1
Buffalo, University of, Buffalo, N. Y	1
California, University of, Davis, Calif	1
Carbon Junior College, Price, Utah	2
Carleton College, Northfield, Minn	1
Carroll College, Waukesha, Wis	1
Case Institute of Technology, Cleveland, Ohio	2
Central Christian College, Bartlesville, Okla	1
Central Michigan College, Mount Pleasant, Mich	1
Centralia Junior College, Centralia, Wash	1
Central State College, Wilberforce, Ohio	2
Chaffey Junior College, Ontario, Calif	1
Chapman College, Orange, Calif	1
Chicago, University of, Chicago, Ill	3
Cincinnati, University of, Cincinnati, Ohio	2
Clarkson College of Technology, Potsdam, N. Y	1
Colby College, Waterville, Maine	1
Colgate University, Hamilton, N. Y	1
Colorado, University of, Boulder, Colo	1
Colorado State College, Greeley, Colo	1
Columbia University, New York, N. Y	2
Connecticut College, New London, Conn	2
Connecticut, University of, Storrs, Conn	3
Contra Costa Junior College, Richmond, Calif	2
Cornell University, Ithaca, N. Y	2
Dartmouth College, Hanover, N. H	2

	Fellows
Delaware, University of, Newark, Del	1
Delaware State College, Dover, Del	1
Delta State College, Cleveland, Miss	1
Dominican College, San Rafael, Calif	1
Drew University, Madison, N. J	1
Drexel Institute of Technology, Philadelphia, Pa	1
Duke University, Durham, N. C	1
D'Youville College, Buffalo, N. Y	1
Eastern Illinois University, Charleston, Ill	1
Edgewood College of the Sacred Heart, Madison, Wis	1
Emmanuel College, Boston, Mass	1
Everett Junior College, Everett, Wash	1
Florida, University of, Gainesville, Fla	2
Fordham University, New York, N. Y	2
General Motors Institute, Flint, Mich	1
Grand Rapids Junior College, Grand Rapids, Mich	1
Gustavus Adolphus College, St. Peter, Minn	1
Hampton Institute, Hampton, Va	1
Hastings College, Hastings, Nebr	1
Hollins College, Hollins, Va	1
Huston-Tillotson College, Austin, Tex	2
Idaho, University of, Moscow, Idaho	1
Illinois, University of, Urbana, Ill	3
Indiana, University, Bloomington, Ind	1
International Christian University, Tokyo, Japan	1
Iona College, New Rochelle, N. Y	1
Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa	1
Jacksonville State Teachers College, Jacksonville, Ala	1
Juniata College, Huntingdon, Pa	1
Kansas University of, Lawrence, Kans	1
Kansas City, University of, Kansas City, Mo	1
Kansas State College of Agriculture, and Applied Science, Manhattan, Kans	2
Kansas Wesleyan University, Salina, Kans	1
Kenyon College, Gambier, Ohio	1
Lamar State College of Technology, Beaumont, Tex	2
Laredo Junior College, Laredo, Tex	1
Lebanon Valley College, Annville, Pa	1
Louisiana Polytechnic Institute, Ruston, La	1
Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La	3
Loyola University, Los Angeles, Calif	1
Manchester College, North Manchester, Ind	1
Mary Hardin-Baylor College, Belton, Tex	1
Massachusetts, University of, Amherst, Mass	1
Michigan, University of, Ann Arbor, Mich	4
Michigan State University of Agriculture and Applied Science, East Lansing, Mich	2
Minnesota, University of, Minneapolis, Minn	1
Missouri, University of, Columbia, Mo	1
Monterey Peninsula College, Monterey, Calif	1
Mount Holyoke College, South Hadley, Mass	1
New York, State University of, Ithaca, N. Y	1
New York University, New York, N. Y	1
North Carolina, Agricultural and Technical College of, Greensboro, N. C	1
North Carolina College at Durham, Durham, N. C	1
North Dakota State College, Ellendale, N. Dak	1
Northeastern University, Boston, Mass	1
Northern Illinois University, De Kalb, Ill	1
Northern Michigan College, Marquette, Mich	1
Northern Oklahoma Junior College, Tonkawa, Okla	1
North Park College, Chicago, Ill	1
Notre Dame, University of, Notre Dame, Ind	1
Oberlin College, Oberlin, Ohio	1
Ohio State University, Columbus, Ohio	2
Ohio University, Athens, Ohio	2
Oklahoma State University of Agriculture and Applied Science, Stillwater, Okla	1
Park College, Parkville, Mo	1
Pennsylvania, University of, Philadelphia, Pa	4
Pittsburgh, University of, Pittsburgh, Pa	1
Pomona College, Claremont, Calif	2
Prairie View Agricultural & Mechanical College, Prairie View, Tex	1
Princeton University, Princeton, N. J	1
Purdue University, Lafayette, Ind	3
Queens College, Flushing, N. Y	1
Reed College, Portland, Oreg	1
Rhode Island, University of, Kingston, R. I	1
Rockford College, Rockford, Ill	1
Rose Polytechnic Institute, Terre Haute, Ind	1
Rutgers, The State University, New Brunswick, N. J	1
St. John's University, Collegeville, Minn	1
St. Joseph's College, Philadelphia, Pa	2
St. Joseph's College for Women, Brooklyn, N. Y	2
St. Mary's College, Winona, Minn	1
St. Olaf College, Northfield, Minn	1
St. Scholastica, College of, Duluth, Minn	1
San Francisco, University of, San Francisco, Calif	1
San Jose State College, San Jose, Calif	2
Savannah State College, Savannah, Ga	1
South Carolina State College, Orangeburg, S. C	1
South Dakota State College of Agriculture and Mechanic Arts, Brookings, S. Dak	1
Southern State College, Magnolia, Ark	1
Southwest Baptist College, Bolivar, Mo	1
Southwest Texas State Teachers College, San Marcos, Tex	1
Southwestern Louisiana Institute, Lafayette, La	2
Stanford University, Stanford, Calif	2
State Teachers College, Dickinson, N. Dak	1
State Teachers College, Mankato, Minn	1
State University Teachers College, Albany, N. Y	1
State University Teachers College, Geneseo, N. Y	1
Swarthmore College, Swarthmore, Pa	1

	Fellows
Tarleton State College, Stephenville, Tex	1
Tennessee, University of, Knoxville, Tenn	2
Texas, Agricultural & Mechanical College of, College Station, Tex	1
Texas Southern University, Houston, Tex	1
Texas Technological College, Lubbock, Tex	1
Trenton Junior College, Trenton, N. J	1
Tufts University, Medford, Mass	1
Tulsa, University of, Tulsa, Okla	1
United States Naval Academy, Annapolis, Md	1
Utah State University, Logan, Utah	2
Vassar College, Poughkeepsie, N. Y	3
Vermont, University of, Burlington, Vt	2
Virginia Polytechnic Institute, Blacksburg, Va	1
Virginia, University of, Charlottesville, Va	1
Virginia State College, Norfolk, Va	1
Washington, University of, Seattle, Wash	1
Washington University, St. Louis, Mo	1
Wayne State University, Detroit, Mich	1
Wellesley College, Wellesley, Mass	2
Wheaton College, Wheaton, Ill	1
Wheeling College, Wheeling, W. Va	1
Wiley College, Marshall, Tex	1
Wisconsin, University of, Madison, Wis	2
Wisconsin Institute of Technology, Platteville, Wis	1
Wittenberg College, Springfield, Ohio	2
Woman's College of the University of North Carolina, Greensboro, N. C	2
Youngstown University, Youngstown, Ohio	1

APPENDIX G

Publications Resulting From Research Grants and Fellowships Fiscal Year 1958

This bibliography of some 1,315 items lists all papers published by NSF grantees and fellows for which the Foundation received publication information during fiscal year 1958. Notification of publication was usually in the form of a reprint or a copy of the paper or book. Approximately 170 grantee institutions and 50 fellowships are represented. Because of timelags between completion of research and publication of results, much of the experimentation covered by these papers was carried on prior to fiscal year 1958, while the results of a great deal of research during fiscal year 1958 will be reported in papers appearing in later lists.

The arrangement of entries is designed to facilitate reference use of the compilation. Grantee items are grouped by National Science Foundation divisions or offices, by programs within each division, and alphabetically by grantee institution within each program.

Papers by fellows are listed in "Division of Scientific Personnel and Education." The fiscal year 1958 papers are listed under the issuing Journals which are arranged alphabetically, with fellows listed alphabetically under the Journal. Because this listing is the first to include fellowship reprints, a supplement is included to cover the years 1952–57. Items in this group are arranged alphabetically by fellow.

Division of Biological and Medical Sciences

DEVELOPMENTAL BIOLOGY

UNIVERSITY OF CALIFORNIA, LOS ANGELES, A. LANG

Lang, Anton. *The Effect of Gibberellin upon Flower Formation.* Proceedings of the National Academy of Sciences, *43:* 709–717 (Aug. 1957).

Sachs, Roy M., and Anton Lang. *Effect of Gibberellin on Cell Division in Hyoscyamus.* Science, *125:* 1144–1145 (June 1957).

UNIVERSITY OF CHICAGO, E. C. OLSON—Olson, Everett C., and Robert L. Miller. *Morphological Integration.* 317 pp. Chicago, Illinois, University of Chicago Press, 1958.

CORNELL UNIVERSITY, P. W. GILBERT—Gilbert, Perry W., and F. G. Wood, Jr. *Method of Anesthetizing Large Sharks and Rays Safely and Rapidly.* Science, *126:* 212–213 (Aug. 1957).

FLORIDA STATE UNIVERSITY, C. B. METZ

Metz, Charles B. *Mechanisms in Fertilization,* pp. 17–45. *In:* Physiological Triggers, U. S. A., 1956.

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Tyler, A., and C. B. Metz. *Effects of Fertilizin-Treatment of Sperm and Trypsin-Treatment of Eggs on Homologous and Cross-Fertilization in Sea-Urchins.* Publicazioni Stazione Zoologica, Napoli, *27:* 128–145 (Dec. 1955).

———, Alberto Monroy, and Charles B. Metz. *Fertilization of Fertilized Sea Urchin Eggs.* Biological Bulletin, *110:* 184–195 (Apr. 1956).

FORDHAM UNIVERSITY, C. A. BERGER—Berger, C. A., E. J. Feeley, and E. R. Witkus. *The Cytology of Xanthisma Texanum D. C.* IV. *Megasporogenesis and Embryo Sac Formation, Pollen Mitosis and Embryo Formation.* Bulletin of the Torrey Botanical Club, *83:* 428–434 (Dec. 1956).

HARVARD UNIVERSITY, L. R. CLEVELAND

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———. *Additional Observations on Gametogenesis and Fertilization in* Trichonympha. Journal of Protozoology, *4:* 164–168 (1957).

———. *Correlation between the Molting Period of* Cryptocercus *and Sexuality in Its Protozoa.* Journal of Protozoology, *4:* 168–175 (1957).

Cleveland, L. R. *Movement of Chromosomes in* Spirotrichonympha *to Centrioles Instead of the Ends of Central Spindle.* Journal of Protozoology, *5:* 63–68 (1958).

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SOUTHERN ILLINOIS UNIVERSITY, F. J. FINAMORE—Finamore, F. J., and G. T. Crouse. *Nucleotide and Nucleic Acid Metabolism in Developing Amphibian Embryos. 1. Isolation and Chemical Identification of Acid-Soluble Nucleotides.* Experimental Cell Research, *14:* 160–165 (1958).

JOHNS HOPKINS UNIVERSITY, A. T. JAGENDORF

Avron, Mordhay, and Andre T. Jagendorf. *Some Further Investigations on Chloroplast TPNH Diaphorase.* Archives of Biochemistry and Biophysics, *72:* 17–24 (Nov. 1957).

Krogmann, David W., and Andre T. Jagendorf. *A Spectrophotometric Assay of the Hill Reaction with Ferricyanide.* Plant Physiology, *32:* 373–374 (July 1957).

MARQUETTE UNIVERSITY, J. W. SAUNDERS, Jr.

Saunders, John W., Jr., John M. Cairns, and Mary T. Gasseling. *The Role of the Apical Ridge of Ectoderm in the Differentiation of the Morphological Structure and Inductive Specificity of Limb Parts in the Chick.* Journal of Morphology, *101:* 57–87 (July 1957).

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UNIVERSITY OF MICHIGAN, N. E. KEMP—Kemp, Norman E. *Electron Microscopy and New Frontiers in Cytology and Histology.* University of Michigan Medical Bulletin, *23:* 197–210 (June 1957).

UNIVERSITY OF NORTH CAROLINA, D. P. COSTELLO—Costello, D. P., M. E. Davidson, A. Eggers, M. H. Fox, and C. Henley. *Methods for Obtaining and Handling Marine Eggs and Embryos.* 247 pp. Woods Hole, Massachusetts, Marine Biological Laboratory, 1957.

NORTHWESTERN UNIVERSITY, R. C. KING

King, R. C., and R. G. Burnett. *Oogenesis in Adult* Drosophila Melanogaster. *V. Mutations Which Affect Nurse Cell Nuclei.* Growth, *21:* 263–280 (Oct. 1957).

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UNIVERSITY OF PENNSYLVANIA, W. G. HUTCHINSON—Medill-Brown, M., and W. G. Hutchinson. *Effect of Penicillin, Growth Phase, Ultraviolet Light, and Ultrasonic Vibrations on the Ability of* Proteus Mirabilis *to Form L Type Colonies.* Journal of Bacteriology, *74:* 280–285 (Sept. 1957).

PRINCETON UNIVERSITY, W. P. JACOBS—Jacobs, William P., and Ielene B. Morrow. *A Quantitative Study of Xylem Development in the Vegetative Shoot Apex of Coleus.* American Journal of Botany, *44:* 823–842 (Dec. 1957).

RICE INSTITUTE, R. V. TALMADGE AND A. C. ENDERS—BUCHANAN, G. D. *Variation in Litter Size of Nine-Banded Armadillos.* Journal of Mammalogy, *38:* 529 (Nov. 1957).

SOCIETY FOR THE STUDY OF DEVELOPMENT AND GROWTH, K. V. THIMANN–RUDNICK, DOROTHEA, ED. *Rhythmic and Synthetic Processes in Growth.* The Fifteenth Symposium of the Society for the Study of Development and Growth. 217 pp. Princeton, New Jersey, Princeton University Press, 1957.

STANFORD UNIVERSITY, D. L. STILWELL, Jr.—Stilwell, Donald L., Jr. *The Innervation of Tendons and Aponeuroses.* American Journal of Anatomy, *100:* 289–317 (May 1957).

TEXAS AGRICULTURAL EXPERIMENT STATION, J. N. WEAVER

Weaver, Nevin. *Effects of Larval Age on Dimorphic Differentiation of the Female Honey Bee.* Annals Entomological Society of America, *50:* 283–294 (May 1957).

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UNIVERSITY OF WISCONSIN, H. W. MOSSMAN—Orsini, Margaret Ward. *The Vascular Knot of the Hamster Uterus: The Placental Arterial Supply and Its Changes during Gestation and Postpartum Involution.* Journal of Morphology, *100:* 565–599 (May 1957).

WITTENBERG COLLEGE, K. J. NORSTOG—Norstog, Knut J. *Polyembryony in* Hierochloe odorata (L.) *Beauv.* Ohio Journal of Science, *57:* 315–320 (Sept. 1957).

UNIVERSITY OF WYOMING, C. S. THORNTON—Thornton, Charles Stead. *The Effect of Apical Cap Removal on Limb Regeneration in Amblystoma Larvae.* Journal of Experimental Zoology, *134:* 357–381 (Mar. 1957).

ENVIRONMENTAL BIOLOGY

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, *3:* 399–409 (Dec. 1956).

———. *Ovarian Morphology and Early Embryology of the Pediculate Fishes* Antennarius *and* Histrio. Bulletin of the American Museum of Natural History, *114:* 331–371 (1958).

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UNIVERSITY OF ARIZONA, A. R. MEAD

Mead, Albert R. *Disease in the Giant African Snail Achatina fulica Bowdich.* Science, *123:* 1130–1131 (June 1956).

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BERMUDA BIOLOGICAL STATION FOR RESEARCH, W. H. SUTCLIFFE, Jr.

Bainbridge, Richard, and Talbot H. Waterman. *Polarized Light and the Orientation of Two Marine Crustacea.* Journal of

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Williams, Roger W. *A New Distribution Record for* Culex Salinarius *COQ: The Bermuda Islands.* Mosquito News, *16:* 29–30 (Mar. 1956).

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UNIVERSITY OF CALIFORNIA, La Jolla, B. P. BODEN—Boden, Brian P., and Elizabeth M. Kampa. *Records of Bioluminescence in the Ocean.* Pacific Science, *11:* 229–235 (Apr. 1957).

UNIVERSITY OF CALIFORNIA, Santa Barbara, E. R. NOBLE—Noble, Elmer R. *Seasonal Variations in Host-Parasite Relations between Fish and Their Protozoa.* Journal of the Marine Biological Association, *36:* 143–155 (1957).

DUKE UNIVERSITY, P. J. KRAMER—Kramer, Paul J. *Some Effects of Various Combinations of Day and Night Temperatures and Photoperiod on the Height Growth of Loblolly Pine Seedlings.* Forest Science, *3:* 45–55 (Mar. 1957).

EMORY UNIVERSITY, F. H. BORMANN—Bormann, F. H. *Moisture Transfer between Plants through Intertwined Root Systems.* Plant Physiology, *32:* 48–55 (Jan. 1957).

UNIVERSITY OF FLORIDA, A. CARR

Caldwell, David K., Archie Carr, and Thomas R. Hellier, Jr. *A Nest of the Atlantic Leatherback Turtle,* Dermochelys Coriacea Coriacea *(Linnaeus), on the Atlantic Coast of Florida, with a Summary of American Nesting Records.* Quarterly Journal of the Florida Academy of Sciences, *18:* 279–284 (1955).

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Carr, Archie. *Notes on the Zoogeography of the Atlantic Sea Turtles of the Genus* Lepidochelys. Revista de Biologia Tropical, *5:* 45–61 (1957).

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INDIANA UNIVERSITY, D. G. FREY—Frey, David G. *The Late-Glacial Cladoceran Fauna of a Small Lake.* Archiv für Hydrobiologie, *54:* 209–275 (Apr. 1958).

INDIANA UNIVERSITY, S. D. GERKING—Gerking, Shelby D. *A Method of Sampling the Littoral Macrofauna and Its Application.* Ecology, *38:* 219–226 (Apr. 1957).

STATE UNIVERSITY OF IOWA, G. E. FOLK, Jr.

Farrand, Richard L., G. E. Folk, Jr., and Marvin L. Riedesel. *Types of Mammalian Hibernation.* Proceedings of the Iowa Academy of Science, *63:* 724–728 (Dec. 1956).

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LONG ISLAND BIOLOGICAL ASSOCIATION, B. WALLACE

Warren, Katherine Brehme, ed. *Cold Spring Harbor Symposia on Quantitative Biology, v. 22. Population Studies: Animal Ecology and Demography.* 437 pp. Cold Spring Harbor, L. I., N. Y., Long Island Biological Association, 1957.

UNIVERSITY OF MIAMI, H. B. MOORE

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UNIVERSITY OF MICHIGAN, W. R. DAWSON

Dawson, William R., and George A. Bartholomew. *Metabolic and Cardiac Responses to Temperature in the Lizard* Dipsosaurus dorsalis. The Anatomical Record, *128:* 538 (July 1957).

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UNIVERSITY OF MISSOURI, P. W. FRANK—Frank, Peter W., Catherine D. Boll, and Robert W. Kelly. *Vital Statistics of Laboratory Cultures of Daphnia Pulex DeGeer as Related to Density.* Physiological Zoology, *30:* 287–305 (Oct. 1957).

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UNIVERSITY OF NEW MEXICO, C. C. HOFF—Hoff, C. Clayton. *List of the Pseudoscorpions of North America North of Mexico.* American Museum Novitates, No. 1875, Feb. 1958, 50 pp.

NORTH DAKOTA AGRICULTURAL COLLEGE, G. W. COMITA—Comita, Gabriel W., and Jean J. Comita. *The Internal Distribution Patterns of a Calanoid Copepod Population, and a Description of a Modified Clarke-Bumpus Plankton Sampler.* Limnology and Oceanography, *2:* 321–332 (Oct. 1957).

NORTH DAKOTA AGRICULTURAL COLLEGE, L. D. POTTER—Potter, Loren D. *Phytosociological Study of San Augustin Plains, New Mexico.* Ecological Monographs, *27:* 113–136 (Apr. 1957).

STANFORD UNIVERSITY, W. C. BROWN

Alcala, Angel C., and Walter C. Brown. *Discovery of the Frog* Cornufer guentheri *on Negros Island, Philippines, with Observations on Its Life History.* Herpetologica, *13:* 182–184 (1957).

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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 1958. 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 a report covering its activities for the previous fiscal year ending on June 30. These 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

These reports contain data on the extent and nature of scientific research and development in the United States. The publications marked with a price may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A Selected Bibliography of Research and Development and Its Impact on the Economy.

Advisory and Coordinating Mechanisms for Federal Research and Development, 1956–57.

Directory of Independent Commercial Laboratories Performing Research and Development, 1957. 40 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.

Research Expenditures of Foundations and Other Nonprofit Institutions, 1953–54.

Science and Engineering in American Industry. Final Report on a 1953–54 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.

VI. The Federal Research and Development Budget, Fiscal Years 1956, 1957, and 1958. 40 cents.

Reviews of Data on Research and Development

These reports, published in leaflet form at irregular intervals, are devoted to specific aspects of research and development. The following issues are available from the National Science Foundation, Washington 25, D. C.

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.

Faculty Scientific Research Activities at Colleges and Universities, 1953–54.

Funds for Research and Development in Engineering Schools, 1953–54.

Funds for Research in Agricultural Experiment Stations, 1953–54.

Scientists and Engineers in Research and Development, 1954.

Science and Engineering in American Industry, 1956.

Highlights of Conference on Research and Development and its Impact on the Economy.

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 Mathematics. 20 cents.

Manpower Resources in the Earth Sciences. 45 cents.

Manpower Resources in the Biological Sciences. 40 cents.

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

Scientific Manpower Bulletins

This series of 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, 1954–1955.

Immigration of Professional Workers to the United States, 1953–1956.

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 copies of the PROCEEDINGS have been issued. Copies listed below 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.*

V. *New York, December 1956.* (Contained in Scientific Manpower—1956.)

VI. *Indianapolis, December 1957.* (Contained in Scientific Manpower—1957.)

Other Scientific Manpower and Education Reports

The publications marked with a price may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Trends in the Employment and Training of Scientists and Engineers. 20 cents.

Scientific Personnel Resources. 50 cents.

Scientific Manpower in the Federal Government, 1954.

Federal Support for Science Students in Higher Education, 1954. 30 cents.

Graduate Student Enrollment and Support in American Universities and Colleges, 1954. $1.50.

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 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.

Non-Conventional Technical Information Systems in Current Use.

Current Research and Development in Scientific Documentation, No. 2.

There are 29 Russian scientific journals which are currently being translated with National Science Foundation support. A listing of these journals, as well as journals being translated with support from the National Institutes of Health and commercial translation agencies, is available upon request to the Office of Scientific Information, National Science Foundation, Washington 25, D. C.

Special Reports

Publications marked with a price may be ordered from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Basic Research—A National Resource. 45 cents.

Government-University Relationships in Federally Sponsored Scientific Research and Development. 40 cents.

Bibliography for the International Geophysical Year. 25 cents.

Federal Financial Support of Physical Facilities and Major Equipment for the Conduct of Scientific Research.

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 Office of Scientific Information, Attention GRI, National Science Foundation, Washington 25, D. C.

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 programs, with instructions for applying.

Committees

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

The Interdepartmental Committee on Scientific Research and Development.

The President's Committee on Scientists and Engineers.