National Science Foundation

10th Annual Report, 1960
National Science Foundation

Tenth Annual Report for the Fiscal Year Ended June 30, 1960
LETTER OF TRANSMITTAL

WASHINGTON, D.C.,

MY DEAR MR. PRESIDENT:

I have the honor to transmit herewith the Annual Report for Fiscal Year 1960 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.
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THE DIRECTOR'S STATEMENT

One of the responsibilities of the National Science Foundation is the continuing study and analysis of the Nation's scientific research and development potential, including research facilities, scientific manpower, and education for science. A comprehensive program of studies based upon information from industry, Government, and nonprofit institutions was initiated some seven years ago. It is now possible to discern trends that shed light upon the current situation as well as being useful for long-range planning purposes. Indeed, on the basis of these and similar studies by industry and other agencies of the Government, the time appears ripe for the Federal Government to plan more effectively with respect to its interest, responsibility and participation in the future of the country's science and technology. At the same time, advantage is being taken of the opportunity to study more carefully the impact of science and technology upon the national economy.

Certain conclusions are clear. For the future, the principal concern lies in the field of education. This has been the subject of considerable discussion and some controversy. As a result, noteworthy progress has been made, especially in self study and improvement by schools, colleges, and other groups involved in general education. Much of the incentive and the pressure has come from the need to improve the teaching of science, but action has also extended to the teaching of modern languages and, in general, to the fundamental subjects of instruction.

There have been a perceptible tightening of standards and critical thought devoted to curricula and to the improvement of teacher training and course content. These efforts have been supported by the Federal Government and by interested organizations and local groups. The teaching profession, especially in secondary schools, has been the subject of sympathetic attention, and its prestige has undoubtedly improved. By and large, however, little progress has been made in providing adequate salaries and career prospects for secondary school teachers. We have still a long way to go.

In the area of scientific research and its extension into development and production there is a growing realization of the importance of continuity and proper apportionment of support through all stages, starting with basic research and extending through applied research, development, and production. However, it is still true that in spite of repeated emphasis upon the importance of basic research, support for this effort has only barely held its own in relation to the larger and seemingly more pressing problems of development. It has proved far more difficult to secure adequate support for basic progress in science than for the applications of science, because
of the seeming vagueness of the enterprise, especially when high-priority, costly practical goals have to be met. Vannevar Bush's pithy statement, "Applied research drives out basic", is constantly being verified. If the full potentialities of our society are to be realized, however, we must by all means insure that the frontiers of science are pushed forward energetically.

Although other shortcomings can be discerned in this whole chain, one outstanding fact has begun to emerge, namely, that our institutions of higher learning are in critical need of assistance, especially in their graduate schools and other professional training centers. The huge and mounting influx of students into our colleges and universities has focused attention upon the need for facilities for housing, classrooms and instruction. As these needs are met, maintenance funds must be provided. The recent report of the President's Science Advisory Committee, SCIENTIFIC PROGRESS, THE UNIVERSITIES AND THE FEDERAL GOVERNMENT, points out that research and education go hand in hand in the graduate schools of our universities; they should not be separated. Much of the present Government support to colleges and universities is earmarked for research, and particular research at that. Ways must be found to improve the environment for graduate student training, to give closer attention to the postdoctoral class, and to provide adequate and up-to-date research laboratories and equipment.

The natural habitat of basic research is the university. Although industry, Government, and independent research institutes do and should conduct basic research related to their objectives, it is the university that provides the freest and most independent environment for the progress of science.

Industry and Government have come fully to appreciate this role of the universities. In a very real sense they are the producers; industry and Government are the consumers. The latter look to the universities to train an adequate number of scientists and engineers through basic research. Government and industry also look to the universities for accurate, up-to-date research data and information, and novel ideas that may be explored through applied research. And finally, it is primarily to basic research that we must look for the occasional large breakthroughs in scientific thought that may revolutionize an era; the environment of universities is especially conducive to such events.

The needs of the universities at the present time are extremely critical. The widened gap between faculty and industrial salaries, in particular, militates against the universities in the retention of their most competent research faculty members and entices their most promising young Ph. D.'s. The graduate laboratories and research facilities of most universities are out of date and quite inadequate as compared with those of industry and Government. In many instances new buildings are required and, in practically all cases, renovation and extension of existing buildings and equipment.
In other respects the situation is even more disturbing. For a number of years an average of fewer than 50 percent of the competent research workers in our colleges and universities have been receiving adequate support for the problems they wish to undertake. For the past several years the national output of scientists and engineers with graduate degrees has remained substantially constant. Since the curve of national research and development effort continues to rise, the conclusion is easy to draw. We are now failing to meet the increasing demand for qualified professional scientists and engineers we require to achieve the research and development goals of the country, much less to meet world competition in modern technology.

To fill these needs by special national programs for each separate problem is only a partial answer. What is obviously needed is a source of funds that will enable a university to exercise initiative, judgment, and competence in meeting its own needs. Such uncommitted funds are now practically impossible to obtain in adequate amounts without Federal contribution. It is worthy of note that the two Federal agencies for which this type of general support in science is appropriate—namely, the National Science Foundation and the Department of Health, Education, and Welfare through its National Institutes of Health, have initiated modest programs of institutional grants to be used for scientific purposes as the head of the institution sees fit. These programs merit close attention. There is an opportunity here for the Federal Government to be of real service, provided adequate support can be furnished without violating the independence of the institution and without causing a withdrawal of other support from State, municipal, or private sources.

It is sometimes said that our major problems would be solved if only the Federal Government would go the whole way and subsidize or underwrite fully the research and training needs of our colleges and universities, thus obviating the need for project grants, equipment and training grants, and other special-purpose funding. It is true that this type of support would simplify university problems and provide the fullest opportunity for a university to grow and develop. It is also true that this type of support has been avoided hitherto, in the hope that universities may not have to become too dependent upon the Federal Government for support of research and research training.

However, now that the Federal Government is initiating a modest program of this type, it is important to call attention to the fact that the provision of uncommitted funds to universities, although admittedly important and hitherto neglected, does not directly accomplish quite the same thing as support by research project. What it does, under wise management and high competence, is to maximize the growth and independence of the institution and its contribution to research and education. On the other hand, the present form of research support in general use by the Federal Government offers the best opportunity to advance the progress of science, as
determined and recommended in each field by the country's leading scientists and engineers. It is also the system best adapted for the accomplishment of specific research of which Government agencies or the Nation may stand in need. These are not, of course, mutually exclusive; the most effective policy would incorporate adequate support of both kinds, with a proper balance between the two.

Support of basic research should be regarded as a form of investment, from which the returns in trained manpower are assured and research returns of definite value to the economy are statistically certain. Indeed, these dividends more than pay for the entire investment.

In addition to the physical needs of our colleges and universities, another problem is now before us—the need for special attention to what may be called "critical areas of science." These may be fields which at a given time show promise of highly significant contributions to the progress of science or to the furtherance of some important application, or both. Current examples are atmospheric physics, oceanography, and high-energy physics. Methods of identifying and dealing with such critical areas as they arise must be improved. The Foundation believes, however, that special attention to critical areas should be superposed upon general support of basic research across the board.

Another and newer kind of critical area is distinguished primarily by the high cost of the research equipment. Typical are high-energy particle accelerators in physics and the rockets and satellites required in space research programs. This problem is especially acute because of the difficult choice that confronts us: the lack of specific evidence as to the nature and importance of the research findings weighed against the prospect of no progress whatever unless the attempt is made. Clearly critical areas requiring very large and costly installations or equipment must be subject to special scrutiny which includes more than scientific justification alone.

So far as the overall progress of science is concerned, it is most important that basic research should proceed according to the judgment of the active research scientists. Each competent researcher is the best judge of the nature and aim of his own research. The whole purpose of the basic research investigator is to make an original contribution to his field of science. He must, therefore, keep fully informed regarding its status and the work of others. Because of this strong motivation, basic research has a "built-in" coordination. This can best be fostered by measures designed to improve communication among scientists. The national effort in basic science would only be weakened by central planning and direction in substantive content.

In development, the situation is quite different. Here the amounts of money are generally large, the precise objectives to be met are known, and the undertaking requires a considerable outlay of effort in manpower and facilities, as well as funds. Planning is essential, notably with respect to the current validity of the objective, the degree to which the proposed
development would meet this objective, and above all, the feasibility of the particular development contemplated. An organization engaged in development has the clear responsibility to pay careful and thorough attention to the planning and management of its development programs. It should provide for sufficient basic and applied research to enable it to plan and carry out its developmental programs most effectively. It should also employ such modern techniques as systems analysis and operations research to improve its planning and decision-making.

A final thought: As applied to the internal affairs of an industrial nation, science and technology have reasonably clear aims. These include national defense, improved health and welfare, full employment, and a high standard of living. In addition to these obvious and relatively well understood aims, however, there is a much deeper significance, especially in the pursuit of science itself. If the noblest ideals and goals of man have meaning, then religion, philosophy, poetry, literature, the arts, and scholarly activities are important considerations. Over the long haul these have played a fundamental role in the progress of man, perhaps the most fundamental of all. Science has provided mankind new vistas and new understanding both of his environment and of himself. Science has discovered and done much to perfect the so-called “scientific method,” a technique that has helped to build a solid and enduring structure of knowledge. We should do well to recognize this aspect of science, for history suggests that the nation that ignores the contributions of scholarly, artistic, and philosophical pursuits to human progress is not capable of lasting leadership.

As the nations of the world work toward a better understanding of their relations, science, as defined by these broader considerations, offers great opportunity for collaboration in the attainment of common goals. Indeed, it may offer the most effective approach to the achievement of peace and justice which we can take at the present time. And we should remind ourselves that as man acquires more and more control over his environment and becomes increasingly able to draw upon nature’s resources, it will require the combined wisdom of all mankind to make wise use of these powers.

ALAN T. WATERMAN,
Director, National Science Foundation.
Stimulating
The
National
Research
Effort
In *Strengthening American Science,* the President’s Science Advisory Committee reported:

It is apparent . . . that the Government exerts a powerful shaping influence on all U.S. science and technology. Not only the Nation’s security but its long-term health and economic welfare, the excellence of its scientific life, and the quality of American higher education are now fateful bound up with the care and thoughtfulness with which the Government supports research. If this support is halting and erratic, if it emphasizes mechanism and “hardware” to the neglect of fundamental understanding, if it lavishes money on a few popular fields and starves others of importance, if it fails to encourage exceptional men and exceptional programs, the net result could be an impoverished science and a second-rate technology.

How can the United States secure its science against impoverishment, prevent its technology from becoming second class during the final half of a century characterized by a scientific and technological revolution?

This Tenth Anniversary Annual Report of the National Science Foundation provides an opportunity for reviewing Foundation programs for promoting basic research and education in the sciences in the broader context of the Federal Government’s response to this challenge.

The three factors which must be considered are:

1. Progress of research in science.
2. Development of the individual scientist.
3. The health and growth of the institutions (the environment) where science is taught and research performed.

**Progress of Research in Science**

**Conduct of Basic Research**

Basic research is an investment in knowledge. Since basic research is exploration into the unknown, the degree of success any single piece
of research may achieve is uncertain. Support must therefore be planned and carried out over a wide range of subjects. Then, statistically, one may be assured of a high return in understanding and a new insight on a fair percentage of the work undertaken. In practice, one may even state with some confidence that the return on this small percentage far more than pays the cost of the entire investment. The analogy can be carried further. One should invest in daring projects that appear to have small chance of succeeding but a big payoff if they do. And there should be a fair proportion of standard gilt-edge projects that promise a small but reliable return. In this way, one can manage to advance knowledge across a wide range of fields, and yet follow an approach that is fiscally reasonable.

Some general understanding of the organizational pattern under which basic research is conducted in this country is essential if we are to resolve problems confronting basic research support today. According to National Science Foundation estimates for 1959–60, out of $12.5 billion total for research and development in the United States, about $1 billion (8 percent) supports basic research. It should be borne in mind that the latter amount covers many types of costs, including the operation of expensive research "tools," such as nuclear particle accelerators, research rockets, and radio telescopes. Of the total funds for basic research the Federal Government is the source of about half; industry gives slightly less than a third; and the universities and other nonprofit institutions contribute about one-fifth.

Another index to the relative proportion of effort among the principal sponsors of basic research is the number of scientists and engineers engaged in these activities. As is well known, many scientists and engineers combine research and development with other pursuits such as teaching or industrial production. If we simply add up the amount of time given to research and development activities by all our scientists and engineers, we find that this amounted in 1958–59 to the equivalent of about 340,000 full-time researchers, or about a third of the total number of persons who are scientists and engineers.

Of the 340,000 full-time equivalents in research and development, a little more than 30,000 are in basic research, or about 9 percent.

The primary source of support for uncovering new knowledge through basic scientific research is the Federal Government, and the primary source of manpower to perform the research is our institutions of higher learning. In fulfilling its commitment to stimulate progress in science, the U.S. Government is today supporting basic research in some 450 universities and research institutions in all 50 States, and in a dozen foreign countries as well.
A very compelling reason for the adequate support of basic research by Government is that such research helps to make possible the wise expenditure of funds for development—always many times costlier than fundamental studies. Sound investment of funds in basic research is the best way to uncover leads in all possible fields. From these leads, one can then select for future development those that appear to have the greatest potentialities.

Support Methods

In furthering the progress of research in science, the Foundation has consistently adhered to the following basic concept which it commends as a guide to the Federal Government and the Nation as a whole with respect to the support of basic research: No able scientist willing to undertake basic research should be precluded from doing so because of lack of financial support. Within such framework the Government invites research proposals from individuals or groups of scientists, submitted through their institutions. With the help of individual reviewers in the field involved and advisory panels whose members are chosen from among the Nation's top scientists and appointed by the agency to assist in the evaluation process, the Federal agency selects for support those proposals judged to have the greatest scientific merit.

This so-called "project method" of research support has a number of advantages. Properly interpreted, the plan is flexible and may be applied to narrowly defined problems in science or to broad areas. It enables the Government to move in freely with the support needed for promising and significant undertakings of current interest. It provides for a national program in the sciences, utilizes the advice of the scientists in each field, and is based upon the significance and merit of the research proposed and the competence of the investigators. Since each grant and contract requires the official indorsement of the investigator's institution, the plan has evolved with the concurrence of the Nation's universities and has had a most important indirect effect in helping to strengthen such institutions. In fact, such aid has often been of critical importance, particularly for the smaller schools.

With the increased sums available to it for support purposes, the Foundation is now able to make more grants of a broader type, often cutting across two or more departments of a university. For example, a grant awarded to the University of Pennsylvania will further research which applies concepts of chemistry and physics to the biological problem of regulation of metabolism within the cell. In another instance, scientists at the Massachusetts Institute of Technology will undertake a concerted attack upon the problem of the production and nature of
plasmas. Included are studies on gaseous electronics processes, plasma statics, magnetohydrodynamics of compressible and incompressible fluids, ionospheric physics, and some branches of astrophysics. This program is being supported by the Foundation with a 3-year grant.

Facilities for Research

Basic research today increasingly requires the use of large, complex, and expensive research tools. Although Government expenditures for research facilities since World War II have run into the hundreds of millions of dollars, for the most part these have been committed to practical research and hence have been available only to a small degree for purposes of basic research.

Traditionally, universities and other private research organizations have provided needed research tools from their own funds or from funds available from state or local sources. Now, however, the need for such major equipment as nuclear reactors, high-energy particle accelerators, high-speed computers, and radio and optical telescopes is too great to be met from such local resources or even from the combined resources of several institutions. If American science is to advance at a satisfactory rate, Federal support of needed facilities must be provided.

Each case must be judged on its individual merits. It is difficult to establish criteria that would be applicable in all cases. Factors to consider include the urgency of the need, the national significance of the development, the availability of trained personnel, and the degree and character of local backing. Recipient institutions are encouraged to participate financially to the extent possible. In some situations, the Federal Government must continue to supply funds for operating and maintenance, in addition to funds for construction.

International Participation

In a larger frame of reference, the progress of science has been measurably stimulated through participation of U.S. scientists in vast programs of international research with very substantial support by Government. An outstanding example is the brilliantly successful International Geophysical Year. Through a special committee established by the International Council of Scientific Unions (ICSU), a program encompassing the entire globe in 13 major fields of physics, together with extensive rocket and satellite programs, was undertaken, with the participation of 66 countries and supported on a world-wide scale by funds equivalent to many hundreds of millions of dollars. The IGY was successfully carried on without reference to political considerations, and demonstrated
that men of many different political persuasions are able to work together harmoniously for the advancement of knowledge.

Some aspects of the successful IGY are being continued under the program known as "International Geophysical Cooperation." Scientific studies are continuing in the Antarctic, in space science, in oceanographic research, and plans are being weighed for further studies in meteorology, geomagnetism, and other subjects. In programs already under way, Federal funds are being used to support special U.S. committees and their secretariats, under the National Academy of Sciences.

Continuing research programs in the Antarctic are being carried on by the 12 nations which participated in the IGY Antarctic program. General scientific recommendations for the area are made by the Special Committee on Antarctic Research (SCAR) of ICSU. The U.S. program is being developed, funded, and coordinated by the National Science Foundation. The Foundation looks primarily to the Committee on Polar Research of the National Academy of Sciences for program recommendations; NSF also considers proposals from qualified scientists interested in carrying out such research. The Foundation works with the Interdepartmental Committee on the Antarctic to coordinate the research activities of other agencies, such as the National Bureau of Standards, the Weather Bureau, and the Geological Survey, and provides them with funds for their participation in Antarctic research. Grants are also made to universities and various interested research organizations to complete the program of scientific activities in the Antarctic. To date, Congress has appropriated $10 million for this post-IGY program in the Antarctic.

Communication of Scientific Information

But whether he pursues his research in the frozen laboratory of the Antarctic or in the cloister of his own laboratory, the scientist wastes valuable hours if he is not familiar with the published results of research in his own field. Time saved for scientists in searching out what is already known is time they can actively spend on research. Improvement in the communication of scientific information is reflected in improved use of scientists' time—in effect, equivalent to an increase in the number of scientists available.

Axiomatic in the scientific community is the statement that no piece of research is complete until it is published. As the pace of scientific research accelerates and scientific publications multiply, it becomes increasingly difficult for a scientist to learn about and obtain access to everything that is published in this field. Accordingly, the Foundation is trying to make it easier for scientists to locate and acquire the published
results of research. The objective is to ensure that any U.S. scientist can obtain any item of unclassified scientific information he needs, no matter where it originates, and to develop improvements in the organization and availability of scientific information on behalf of all U.S. scientists.

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

Thus through vigorous support of meritorious research on both national and international fronts, through the provision of modern research facilities, and through improving communication among scientists, the Federal Government stimulates the progress of United States research. No other nation surpasses the United States in the scope and depth of its science. Since 1945, its scientists have been awarded more than half of all Nobel prizes in science—a not insignificant measure of the wisdom with which the Nation has pursued its policy toward encouraging science.

Development of the Individual Scientist

However meritorious the settled course of the Government’s commitment to sustain and support the progress of research in science in these portentous years, trained manpower is required to convey it to fulfillment. As outlined in the foregoing section, Government seeks in a variety of meaningful ways to stimulate the progress and growth of scientific research. With equal vigor, it seeks to develop capable men and women who can be depended upon by the Nation to attain the goals of its scientific endeavor. At issue, therefore, is the competence of students, scholars, and teachers.

The manpower needed to carry forward the science of tomorrow is in today’s classrooms across the Nation. Questions of moment are:
What is being taught? Who is doing the teaching? What are the opportunities for those who graduate? Satisfactory answers to these questions need urgently to be found if we are to meet fully our science-manpower requirements at this midcentury point in the scientific revolution. A panel of the Nation's foremost scientists and educators who serve the Federal Government did supply forthright answers to these questions, concluding that:

... Americans should attach greater value to intellectual excellence.

... Every school and college should reexamine its curriculum to make sure that in every aspect it is giving adequate challenge to the intellectual capacities of its students.

... We should do far more than we are now doing to enhance the prestige of the teacher and to provide him with more effective support in his efforts to improve the effectiveness of his teaching.

... We should move much further in the direction of adapting our educational programs to the widely varying competence of students, and seek especially to meet the needs of the most gifted students.

... We should improve our scientific education at all levels, attempting to give better understanding of science to the nonscientist as well as to discover and stimulate more individuals who have the talents to become scientists and engineers.

... To attain these ends we conclude that four major areas need specific and urgent attention throughout our educational system:

(1) the curriculum and the content of courses,
(2) the quality and effectiveness of teachers,
(3) the recognition and encouragement of students, and
(4) the development of intellectual leadership.**

Fellowships in Science

These objectives characterize the commitment of the Federal Government in its efforts to provide means for developing the numbers and kinds of well trained scientists required by industry, education, and Government. The Foundation's fellowship program, oldest of all Foundation-supported programs, is typical of the kind of support provided by other agencies of Government. It offers aid to graduate students, teachers, and advanced scholars in science, mathematics, engineering,

** From Education for the Age of Science, a statement by the President's Science Advisory Committee, May 1959.
and certain social sciences, according to plans designed to meet the educational needs of individuals. It was inaugurated in 1952 by the predoctoral and regular postdoctoral programs with a budget of $1.4 million—almost half the Foundation’s appropriation for that year.

As new needs have become apparent, additional programs have been added: in 1956, the senior postdoctoral program; in 1957, the science faculty program; in 1959, the cooperative graduate, teaching assistants, and secondary school teachers programs. By the end of fiscal year 1960, approximately $43 million will have been used for support of graduate students, teachers, and advanced scholars through these seven fellowship programs. After awards have been made for 1960, an approximate total of 13,000 graduate students and advanced scholars in science, mathematics, and engineering will have received awards, from among about 50,000 applications.

It should be noted, also, that the high standards of selection for Foundation fellowships have resulted in wide-spread interest in the applicants, with the result that many of the unsuccessful applicants for Foundation fellowships have received awards from other sources. This is particularly true in the case of applicants included in the honorable mention lists published by the Foundation each year.

The fellowship programs are productive methods for encouraging the college graduate to continue his education into, through, and beyond the graduate level of competence in science. Measures were needed as well to stimulate the enthusiasms of youth toward careers in science. Early in its history the Foundation, charged with responsibilities for scientific education policy as well as science policy, began to look closely into the training of scientists and engineers in the United States. It was an era when shortages in these professions were becoming severe. Newspaper and journal articles of the day reflected the growing anxiety about the Nation’s chances of providing both for its immediate needs and for its anticipated growth in needs during the next few decades.

Science Teacher Training

It became clear to the Foundation that substantial support of scientific education programs was required in order that scientific progress and continued technological superiority might be assured. The immediate objectives would be to stimulate more young people to take up science, and beyond that to enable their teachers to improve themselves in the subjects they were teaching so that they could better stimulate their students.

An experimental program of institutes for teachers of science was therefore begun by the Foundation in fiscal year 1953, apparently the
first such effort ever sponsored by the Federal Government. It was an immediate success, and has been expanded each succeeding year.

This marked the beginning of a shift in national policy. Heretofore, the Federal Government's stake in education was never felt to be substantial enough to justify such direct action in the field of teacher training. The NSF experiment, coming at a time of great national need, paved the way for realization that the Federal Government does indeed have a stake in ensuring that the Nation's teachers are well educated so that, in turn, their students—the oncoming generation—will be trained to meet the demands of their civilization.

At the same time, the traditional place of State and local governments as managers of their educational systems was carefully preserved, through the NSF system of support to locally initiated projects rather than through establishment by the Federal Government of its own educational operations.

Other Government agencies followed this lead in establishing institute programs. Thus, the Foundation sponsored during one year—jointly with the Atomic Energy Commission—two institutes in nuclear engineering for college teachers; the AEC later obtained authority and funds for this type of program, and took over the sponsorship of these and several similar institutes.

The Foundation initiated, as well, certain special projects in science education designed: (1) to supplement the secondary school students' classroom training in science by introducing lectures by visiting scientists, supporting programs of State academies of science, and providing summer research training for students of special ability and aptitude; (2) to provide opportunities for undergraduate students in science, mathematics, and engineering to obtain experience in research laboratories, and to assist teachers by supporting conferences and special academic-year programs and programs of research participation; and (3) through programs of public understanding of science, to improve citizen understanding of the role of basic research and its fundamental relationship to progress in engineering and technology.

Support of teacher training became national policy in 1958. President Eisenhower, in a special education message to Congress, pointed out that programs of the National Science Foundation "have come to be recognized by the educational and scientific communities as among the most significant contributions currently being made to the improvement of science education in the United States." His message recommended a fivefold increase in appropriations for Foundation educational activities; of the five objectives he listed, three—improvement of subject-matter knowledge of science and mathematics teachers, improvement of
course content, and encouragement of science as a career—represented new fields of endeavor for the Federal Government, fields which had already been the subjects of “pilot experimentation” by the Foundation.

The same message recommended extension of the institute principle to foreign languages and counselling, under the sponsorship of the Office of Education.

Legislation embodying the presidential proposals was passed by the Congress in the National Defense Education Act of 1958. A milestone in Federal recognition of the problems of education, it is the national expression of policies earlier given impetus and substance by the pioneering programs of the National Science Foundation in science education.

**Curriculum Improvement**

A second major Foundation policy move in the field of science education came with the inauguration of projects designed specifically to improve science curricula within the Nation's schools. It was recognized early in the Foundation's history that, too often, science courses were being taught on the basis of outmoded textbooks and obsolete theories. Although teachers and school administrations had tried to keep up with rapidly evolving scientific disciplines, there existed no systematic channels through which they could learn of these changes in a manner designed to enable them to incorporate the knowledge into their classroom situations.

The Foundation also recognized that it was in the national interest to involve broadly based groups in action programs to remedy this problem. The problem had been identified; further discussion would not contribute to a solution unless the groups concerned were committed to produce specific materials useful to the classrooms at various levels.

Similarly, the NSF has scrupulously maintained the principle that, although classroom materials might be produced with the aid of the Federal Government, the Government has no control whatsoever over the content of these materials nor over their distribution. This remains in the hands of the scientists. The Government has no mechanism to "sell" the materials produced; the aim is merely to make available classroom materials that, if they are indeed better, will sell themselves to the schools needing them.

**The Health and Growth of Institutions—Environment of Teaching and Research**

Although the settled course of Federal aid to science and the scientist may hopefully continue along the constructive patterns outlined above, it needs underpinning in resolving a problem that has been paid relatively
little attention—support for educational institutions to enable them to
develop their own capabilities in science and engineering.

Institutions have benefited substantially from Government support
of research projects and from awards, such as fellowships, to individuals,
but they have received little aid of a sufficiently general type to enable
them to carry out their own plans for growth in science and engineering
and to maintain a proper balance between these activities and others in
which they engage. The needs are great: Graduate research laboratories
require modernization in terms of buildings, equipment, and space; the
salary scale in many institutions urgently needs adjustment upward;
there is an acute and a continuing shortage of maintenance and operat-
ing funds; in the secondary schools the salary scale is also low. Although
some progress is being made, much still remains to be done.

The Federal Government's policy with respect to the problems of the
institutions is to point out the needs and to emphasize the importance of
satisfying those needs—to the extent possible and in accordance with
American traditions—from State and private sources. But it is also the
responsibility of the Federal Government to exercise leadership in meet-
ing this problem. The inadequacy of resources available to our educa-
tional institutions is a national problem which the Federal Government
must help to meet.

Another problem is the growing need to evaluate and dispose of com-
peting claims by those who support special areas of basic research
declared to be critical. Atmospheric physics, oceanography, meteor-
ology, and seismology are examples of areas which in recent years have
been found to lack adequate support, trained personnel, facilities, and
equipment. Different techniques may be required for handling such
problem areas, but these special problems should not obscure the need
for comprehensive support of basic research in all fields of science.

Support Should Emphasize Basic Research

The university is the traditional home of basic research. Ideally, it
is here that the so-called uncommitted investigator, in an atmosphere of
academic freedom, can pursue his individual researches without refer-
ence to practical objectives. In recent years, however, the universities
have been subjected to new pressures in the form of the Government's
need for a wide variety of so-called "contract research." Both the
scientific community and the Federal Government have expressed con-
cern lest outside demands for the solution of pressing practical problems
jeopardize the university's traditional role of education and free research.
The Foundation found it desirable to make a special study of the situa-
tion—"Government-University Relationships in Federally Sponsored Scientific Research and Development." This study notes that:

In certain specialized fields, such as engineering, agriculture, and medicine, applied research is frequently closely related to educational objectives. Federal support of applied research projects in these fields appears to present no fundamental problem in terms of interference with the traditional functions of colleges and universities. However, with such exceptions noted, . . . Federal agencies [should] consider other alternatives before establishing large-scale applied research and development projects (particularly those concerned with development and testing) within institutions of higher learning. Such alternatives would include: (a) Federal laboratories; (b) industrial or other private laboratories; and (c) research centers organizationally separated from the institution proper.

The question of preserving the basic research functions of our universities is fundamental. So long as our universities are not able to obtain adequate funds to support normal activities, they may be tempted to supplement regular budgets, and possibly in so doing, to undertake projects and programs to meet needs other than strictly scientific and educational. This means that teachers and experienced research investigators needed for the guidance and training of future scientists may be diverted to urgent practical problems or away from a specialty of their free choice.

Rise of New Types of Research Organizations

It should be noted, also, that the years since the war have marked the rise of new organizational forms for the furtherance of basic research. These include Federal contract research centers, such as the national laboratories, of which Los Alamos, Argonne, and Brookhaven are major examples, which are managed by a university, a group of universities, or an industrial concern under contract to the Federal Government. In general they are engaged in both basic and applied research, where considerations of both cost and security have dictated that the work be carried on under direct Government sponsorship.

More recently, groups of universities have begun to collaborate in similar fashion to conduct basic research in other fields. In the field of astronomy, for example, the Foundation is supporting two major projects—the radio astronomy facility being constructed and operated at Green Bank, W. Va., by Associated Universities, Inc.; and the optical astronomy facility on Kitt Peak, Tucson, Ariz., being constructed and operated by the Association of Universities for Research in Astronomy,
A recent group to enter the field is the University Committee for Atmospheric Research, organized by a group of 14 universities.

It is clear that certain broad fields, such as astronomy, atmospheric research, oceanography, materials, and space research, lend themselves well to cooperative effort. It is practically certain that the expanding horizon of research in this country will dictate the organization of new forms of research activity here. In the first place, there will continue to be pressures for an organized attack upon any critical, practical problem, of either basic or applied science, such as that which currently obtains with respect to materials. Whether these needs can best be met by establishing special centers for the purpose, or whether coordinated programs should be set up in more decentralized fashion, will be matters for consideration in each case. In the second place, the voice of science itself will come increasingly to be heard demanding support for highly significant areas of science, mainly basic.

**Group or Individual Support?**

A word of caution is in order here. We must, of course, be alert to future trends and do justice to concerted efforts in science, but we must also be alert to the weaknesses as well as the strengths inherent in massive and concentrated effort. Are we likely, for example, to overemphasize group activity at the expense of the individual researcher? Certainly history indicates that capital discoveries can usually be attributed to a single person or a few individuals, although it is quickly admitted that their particular contributions may be only the climax of a host of prior smaller research contributions. Those who are familiar with group activities will probably agree, if they are candid, that the tendency of the group is to be conservative although powerful. In dedication to its objective, it reacts rather conservatively to radical ideas or subject matter lying on the periphery of its main activity. Furthermore, an organized group tends toward a singleness of purpose and of method which by its very nature is apt to ignore ideas from outside.

The large research center introduces another quite serious problem. A unique bulwark of university research is admittedly the close association between graduate faculty and graduate students. How can a specialized research center or facility effectively collaborate with university research and graduate education—if within the university, it tends to monopolize attention; if remote from the university, it suffers from inaccessibility? Although an organized group can mount a vigorous attack against broad and complex research problems, support must not be withheld from individuals and smaller groups who may approach the subject from other disciplines or other points of view. It is important
to achieve a desirable balance between group and individual effort, certainly in basic research; neither has sole merit.

**Urgent Laboratory Needs**

Today, outstanding needs exist that are not being met. Chief among these is the need for new or renovated laboratories, for research and teaching equipment and facilities, and, in certain fields, for costly modern research installations. Accordingly, the Foundation has recently embarked on a small experimental program designed to furnish funds for these purposes on a matching basis—that is, the Foundation furnishes half of the funds and the institution furnishes the other half. On top of this is the ever-mounting cost of maintenance. The situation appears to call for general aid to U.S. universities patterned somewhat after that provided universities in the United Kingdom by the University Grants Committee. In any event, the question arises of direct subsidy to educational institutions in order to increase the overall strength of their departments and to provide greater flexibility in their administration.

Direct financial assistance to academic departments or institutions raises a serious policy question: Should the Federal Government break precedent and provide direct aid to higher education in the fields of science? Can this be done without danger of loss of independence of the institutions supported? Can this be done wisely and acceptably by selective support in the manner of the current research support, or should it be done universally according to some suitable formula? Presumably, an obvious safeguard would be the provision for matching funds. Then there is the complicating factor of two primary classes of institutions: public and private. Despite the difficulties, however, it is quite clear that the needs are real and urgent. The responsibility of the Federal Government is to learn the facts, point out the problem and its urgency, and see that effective action is taken. This means consideration both of ways to assist State and private sources to meet the need (through such measures as revision of the tax structure), and of ways and means to provide some degree of direct support.

**In Summary**

Federal Government support of basic research and education in the sciences has clearly demonstrated its vitality and flexibility. In its broad attack on the degenerative and crippling diseases that afflict mankind; in its development and exploitation of nuclear energy for peaceful purposes; in its support of basic research unrelated to practical objectives, the Government effort has contributed to the general welfare. In doing
so, it has not encroached directly upon the independence of individual
scientists and groups supported. Federal support of research at colleges
and universities exists in various forms ranging from the very narrow to
the very broad. The operations of current forms of support are con-
tinually studied with a view to adopting modifications and alternatives
which would improve the environment for basic research and which at
the same time would not be subject to abuse. All forms of support, both
narrow and broad, have their place in the general pattern of Federal
support. In the Foundation, we feel that each agency should use those
forms best suited to particular needs at a particular time and should be
free to vary the general pattern whenever desirable.

U.S. Research Strong

Research in the United States is inherently strong and versatile and,
in comparison with other countries, is especially strong in industry-
related programs. A nationwide program in support of basic research
by the Federal Government has been established, aimed at progress in
science along lines laid down by the scientists themselves. This program
includes, as an important component, basic research in support of areas
of research and development underlying the missions of individual
Federal agencies. Basic research is also conducted vigorously by a
number of leading industries, many of which provide support to univer-
sities and other research establishments chiefly in areas of interest to
them. Colleges and universities continue to constitute the principal cen-
ters of basic research activity.

The evidence is, however, that basic research in the United States
should be more strongly supported at colleges and universities in order
to strengthen our future technology through progress made on the
frontiers of science, in order to retain highly competent staff, and to
assure high quality training of a great number of young scientists and
engineers.

Government Organized for the Job

The Federal Government is now better prepared than ever before for
the consideration of such matters because, in addition to the interested
departments and agencies, there is the new Federal Council for Science
and Technology, recently established by the President; the Special Assis-
tant to the President for Science and Technology, in the White House;
and the very active President's Science Advisory Committee.

Responsibilities for science matters in the Federal Government can
be described as follows: With respect to the role of the Federal Govern-
ment in the support of basic research, the National Science Foundation
with its National Science Board is primarily responsible for dealing with policy concerning Federal support of basic research throughout the country. On matters of policy coordination and future planning among Federal agencies, the Federal Council for Science and Technology makes recommendations to the President. The President’s Science Advisory Committee, drawn from non-Government scientists and engineers, considers overall scientific and technological matters in relation to Government policy, with special reference to national security. The presence in the White House of the Special Assistant to the President for Science and Technology makes available to the President at all times advice and counsel on a wide range of scientific and technical affairs.

**Potential Not Realized**

In spite of the growth and strength of Federal programs in research and development and the assets that have been described, the potential of the country in science and technology is far from being realized. The element most requiring attention is a greater degree of support throughout the country for basic research and for the education and training of scientists and engineers. To realize our full potential in basic research, there must be widespread public recognition, understanding, and appreciation of the importance of intellectual and scholarly activity, and the pursuit of excellence in all fields of intellectual endeavor.

The fact remains that, in this country especially, we have not yet reached the point where we can step forth boldly and justify basic research in terms of its important objective, namely, the pursuit of knowledge for its own sake—as typified by the work of Galileo, Newton, Maxwell, Faraday, Henry, Darwin, Gibbs, and Einstein. Until we are willing to acknowledge and indeed proclaim the importance of purely intellectual and spiritual goals, we shall never realize the full advantages of basic research. If this point of view is correct, public attitudes must change to ensure United States science of high quality.
A Photographic Sampling of Foundation-Supported Activities
PHOTO CREDITS

Electric Eel Illuminates Mechanism of Nerve Activity

Of the 5- to 7-foot length of an electric eel, all but the first foot constitutes the electric organ composed of compartments arranged in columns. Each compartment is composed of a single cell, an electroplax, about one-half inch long, capable of producing 0.24 volt. The removal of one of these cells and its mounting for experimental purposes are also shown. See page 68.
Project ICEF for Studying Cosmic Rays at High Altitudes

International Co-operative Emulsion Flights (PROJECT ICEF) took place from USS VALLEY FORGE early in 1960 to capture high-energy cosmic rays and the succeeding particle jets on nuclear emulsion flown at 100,000 feet in southerly latitudes. The giant emulsion stack has been divided among many universities in the United States and abroad for analysis and study. Project ICEF, sponsored by the National Science Foundation and the Office of Naval Research, is directed by the University of Chicago.

LEFT PHOTO shows 10 million cubic-foot balloon poised on bow of the aircraft carrier just prior to launching. Balloon and ship’s stack gas stand straight up, showing care and precision with which carrier was kept on course to provide a “no wind” condition on deck.

RIGHT PHOTO shows battered gondola containing nuclear emulsion, after one flight and prior to a second.
Balloon-borne Telescope Photographs Interior of Sun Spot

Project Stratoscope continues outstanding balloon astronomy research. The above photograph, released by the Foundation and the Office of Naval Research, was taken by Stratoscope I—12-inch solar telescope-camera—at an altitude of 80,000 feet, and shows clearly for the first time white dots in the center of sun spot umbra. These spots, less than 200 miles in diameter, are apparently convection cells of rising gases, strongly suppressed by the magnetic field of the sun spot.

Photograph below show fused-silica primary-reflective mirror for a 36-inch telescope now under construction for observing stars, planets, and nebulae. The telescope with camera equipment will be lofted by unmanned balloon by the Princeton University Stratoscope II team.
SUMMER PROGRAM FOR RESEARCH
PARTICIPATION BY TEACHERS

One of the summer programs sponsored by the National Science Foundation enables high school and college teachers to conduct research under the guidance of qualified scientists at various university campuses. The experiment shown here was conducted under this program to investigate discrimination learning by rats. Suspended behind the five openings are cardboard inserts with varying size circles. The hungry rat must leap an eight-inch gap from the jumping platform to the "correct" circle which will swing back to provide the reward—cottage cheese. If the rat makes the wrong selection, it bumps its nose and falls into a net instead.
Bryozoa, a group of small aquatic organisms known as moss animals because of their superficial resemblance to plants, are the subject of a comparative study recently undertaken by an NSF grantee. An example of a bryozoan is *Fenestella rudis* Urlich, shown here. The genus *Fenestella* (resembling windows) occurred abundantly during the Paleozoic Era 330 million years ago. Despite an exceptionally delicate structure, nearly infinite numbers of bryozoa, each surrounded by calcareous walls, built great reefs. Some of the largest reefs, estimated to be 240 million years old, occur in the western approaches of the Ural Mountains. Acting much like giant sponges, the reefs often become saturated with oil, and in fact are a principal source of petroleum in Russia. The twisted shells are those of the marine worm *Spirobis*, often found in association with a *Fenestella* colony.
Recognizing the urgent need for new and more modern research facilities, the Foundation has provided assistance to universities and other nonprofit research institutions. The accompanying photograph is of a new 32,000-square foot, 4-story laboratory building at the Marine Biological Laboratory, Woods Hole, Mass. It replaces three wooden buildings dating from the late 19th century and provides research space for approximately one-third of the 375 to 400 summer investigators. It contains such special features as X-ray, cesium radiation, and isotope units, and refrigerated salt water laboratories. The shell of the building is waterproofed reinforced concrete faced with vertical cypress planking.
Unique Sacred Image of Tribal God Found in Arizona Excavations

A unique Katchina, or image of a tribal god, was one of the discoveries of an archaeological expedition to eastern Arizona. The nine-inch multicolored image carved from sandstone was found in a secret crypt in the remains of a large Kiva, or pueblo ceremonial chamber, near Vernon. When unearthed, the image's right arm was missing, probably broken off intentionally to curtail the image's "god-like" powers when the Pueblo Indians abandoned it six to seven centuries ago. The photograph is of a replica made at the site.

For description of other discoveries of this expedition see page 71.
New Optical Facilities at Kitt Peak National Observatory

Kitt Peak National Observatory, dedicated March 15, 1960, has begun a major observing program with its 36-inch reflecting telescope, housed in building shown above. The structure includes office and dark room facilities, and an unusually high pier for the telescope to raise it above air turbulence at ground level.

Below is artist’s conception of what will be the world’s largest solar telescope, now under construction at the observatory. It will have a focal length of 300 feet, and will form images of the sun almost a yard in diameter. The building will stand 110 feet high, and the diagonal shaft will be 480 feet long, of which 280 feet will be underground. The observing room will also be underground.

Both the Kitt Peak National Observatory and the National Radio Astronomy Observatory are national research centers open to all qualified astronomers. They are maintained by the National Science Foundation; Kitt Peak is operated by the Association of Universities for Research in Astronomy, Inc., and NRAO by Associated Universities, Inc.
Radio Telescopes in Use at National Radio Astronomy Observatory

National Radio Astronomy Observatory telescopes now include the 85-foot Tatel telescope (above) and the "Little Big Horn" (below). The Tatel instrument has been used since March, 1959, for projects including a radio contour map of the center of the Milky Way galaxy and Project Ozma, to listen for signals by other beings in outer space. It is on a polar mount with one axis parallel to the axis of the earth and the other perpendicular, and may be rotated to point steadily at a celestial object moving across the sky.

The "Little Big Horn" is a radio telescope of unusual design, known technically as a horn antenna. It is fixed so that once each day it observes the strong radio source in Cassiopeia. This is used to measure accurately the energy of the incoming radio waves—which the 120-foot-long horn is particularly suited to do—and thus provides a calibrated source in the sky that all radio astronomers may use as a standard.
Maze for Studying Variation in Gravity Response of Fruit Flies

A. Entire maze. Flies are introduced in vial at left and finish in vials at right, being attracted by food in the latter vials and by a fluorescent light in a vertical position at the right. Variation in response to gravity causes the flies to finish in vials at different heights. By means of this maze it has been possible to show that the genetic variability of flies introduced into the maze influences the variability of their response to gravity. (See page 68).

B. Maze consists of numerous T-units in which flies, moving from left to right, are confronted with choice of going upwards or downwards. Cones discourage backward movement of the flies in the maze. One such unit and parts of two others are shown here.
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Research Programs

The Foundation's programs for the support of basic research are administered through the Division of Biological and Medical Sciences; the Division of Mathematical, Physical, and Engineering Sciences; the Office of Social Sciences; and for research to be carried out in the Antarctic, through the Office of Special International Programs.

Since the establishment of the Foundation, resources for these programs have grown from $1 million in 1952 to $78 million in 1960, recognition by the Government of the vital importance of basic research to our progress as a Nation and of the wholehearted acceptance of the Foundation and its programs by the scientific community.

These grants have been primarily for the work of individual scientists, at the Nation's colleges and universities, for specific research projects. Recently the research support program has been extended to provide support for "coherent" areas of sciences—research projects that are extremely broad in scope and may embrace the work of several investigators in a number of scientific disciplines. Examples of this type of support include research into the nature of the enzyme reactions through which the living cell obtains and makes use of the energy necessary for growth and development, the problem of the production and nature of plasmas, and low-temperature phase transitions. Such projects may enlist the joint efforts of chemists, physicists, biologists, and engineers.

NSF is also alert to problem areas of science, so-called critical areas, which have become so because of the stage of development of the science or because of national needs. For example, increased aid is being provided for oceanography and atmospheric sciences.

Support has been provided for the purchase of general purpose research equipment (electron microscopes, ultra centrifuges, etc.) and for specialized facilities such as nuclear research reactors, controlled environment laboratories, computer centers, and an oceanographic research vessel. In the past year such support has been expanded to provide assistance...
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on a matching basis for the construction and renovation of graduate
research laboratories.

Facilities support has been extended to meet the essential need for
major facilities which no single university could afford. For example,
in the field of astronomy the Foundation fully supports and maintains
national observatories managed by university associations and available
to any qualified U.S. scientist for research purposes. They include
the National Radio Astronomy Observatory, Green Bank, W. Va., and
the Kitt Peak National Observatory, for optical astronomy, near Tucson,
Ariz. A center for research in the atmospheric sciences has been initiated.

A detailed listing of research grants may be found in appendix C.

DIVISION OF BIOLOGICAL AND MEDICAL SCIENCES

Current Research Support

Developmental Biology

The Developmental Biology program supports a wide range of pro-
jects, wide both with respect to types of organisms used and to the level
at which the investigator is working. Studies at the organismal level
include microscopic and macroscopic changes in morphology during the
life history of the organism, starting with the zygote and ending either
with fully differentiated cells (from which originate a new generation
of zygotes), or with ante mortem changes (terminating a generation).
Typical of research at this level are an investigation of the early de-
velopment of the mammalian embryo, using a technique which permits
selective destruction of specific areas of the embryo without its removal
from the uterus, and various studies of differentiation in the cellular
alimentary system.

At the cellular level is research on tissue and cellular changes which can
often be causally associated with cellular interactions or morpho-
logical effects of products of one cell type upon cells of a different type.
Examples of such studies would include investigations into processes reg-
ulating morphogenesis in tissues of vascular plants; research on selective
adhesion among embryonic chick cells which are aimed at providing
insight into the causes of morphogenetic movements during development;
and studies of the effect of a maternal manganese deficiency on morpho-
genesis of the inner ear.

Work at the subcellular level is aimed at the study of fine structure,
subcellular particles, macromolecular compounds, cytoplasmic duplica-
tion, chromosomal differentiation, immunological specialization, en-
zyme patterns, DNA-RNA-protein relations, and synthesis of proteins.

Investigations in this area include studies of the physical basis of plant
cell-wall growth; differentiation of protein patterns during develop-
ment; and characterization of respiratory enzymes of mitochondria and
subcellular organelles, followed by a study of development after experi-
mental modification of specific metabolic pathways.

Environmental Biology

The Environmental Biology program encompasses several areas which
can be considered to constitute the general field of ecology in its broad-
est definition.

Quantification of major energy and water exchanges, and determina-
tion of the annual net production of dry matter by green plants, and the
annual energy turnover of herbivore populations of rodents, lagomorphs,
and ants within a desert crenote-bush community constitute the objec-
tives of one type of research effort being supported in the area of com-
munity energetics. Another undertaking illustrative of work underway
in this area involves studies of temperature effects on the total metabolism
of a shallow-water estuarine-benthic community and upon laboratory
microcosms representing the natural conditions of planktonic commu-
nity or fresh-water pond habitats.

Animal orientation and behavior investigations being supported in-
clude those involving the physical basis for the orientation of birds and
other organisms during migratory activities, and the physiological mech-
nisms which tend to initiate migration.

When properly interpreted, data from Foundation-aided studies of
fossil pollen and invertebrate animals taken from cores of lake beds and
marine sedimentary deposits, should yield important additional clues to
the environmental conditions and the patterns of plant and animal dis-
tribution of early geological periods, as well as reveal parameters of climatic cycles and further information on evolutionary processes of
modern-day organisms.

Included at the forefront of ecological research today are investigations
concerned with mechanisms governing population structure and change.
At one institution a series of laboratory experiments utilizing quantitative
biological models has been designed to analyze the role of intergenus,
terrestrial, and intraspecies competition in population phenomena.
At another laboratory, rates of biological efficiency and population response
certain lower invertebrates to controlled predation, immigration, and
radiation are receiving study.

Most of the combined nitrogen in the oceans is believed to be present
as nitrate in the deeper waters. Although the conversion of organically
combined nitrogen to nitrate usually involves nitrification by suitable
marine microorganisms, the organisms responsible for the nitrification

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on a matching basis for the construction and renovation of graduate research laboratories.

Facilities support has been extended to meet the essential need for major facilities which no single university could afford. For example, in the field of astronomy the Foundation fully supports and maintains national observatories managed by university associations and available to any qualified U.S. scientist for research purposes. They include the National Radio Astronomy Observatory, Green Bank, W. Va., and the Kitt Peak National Observatory, for optical astronomy, near Tucson, Ariz. A center for research in the atmospheric sciences has been initiated.

A detailed listing of research grants may be found in appendix C.

DIVISION OF BIOLOGICAL AND MEDICAL SCIENCES

Current Research Support

Developmental Biology

The Developmental Biology program supports a wide range of projects, wide both with respect to types of organisms used and to the level at which the investigator is working. Studies at the organismal level include microscopic and macroscopic changes in morphology during the life history of the organism, starting with the zygote and ending either with fully differentiated cells (from which originate a new generation of zygotes), or with ante mortem changes (terminating a generation). Typical of research at this level are an investigation of the early development of the mammalian embryo, using a technique which permits selective destruction of specific areas of the embryo without its removal from the uterus, and various studies of differentiation in the cellular slime molds.

At the cellular level is research on tissue and cellular changes which can often be causally associated with cellular interactions or morphological effects of products of one cell type upon cells of a different type. Examples of such studies would include investigations into processes regulating morphogenesis in tissues of vascular plants; research on selective adhesion among embryonic chick cells which are aimed at providing insight into the causes of morphogenetic movements during development; and studies of the effect of a maternal manganese deficiency on morphogenesis of the inner ear.

Work at the subcellular level is aimed at the study of fine structure, subcellular particles, macromolecular compounds, cytoplasmic duplication, chromosomal differentiation, immunological specialization, enzyme patterns, DNA-RNA-protein relations, and synthesis of proteins.

Investigations in this area include studies of the physical basis of plant cell wall growth; differentiation of protein patterns during development; and characterization of respiratory enzymes of mitochondria and subcellular organelles, followed by a study of development after experimental modification of specific metabolic pathways.

Environmental Biology

The Environmental Biology program encompasses several areas which can be considered to constitute the general field of ecology in its broadest definition.

Quantification of major energy and water exchanges, and determination of the annual net production of dry matter by green plants, and the annual energy turnover of herbivore populations of rodents, lagomorphs, and ants within a desert creosote-bush community constitute the objectives of one type of research effort being supported in the area of community energetics. Another undertaking illustrative of work underway in this area involves studies of temperature effects on the total metabolism of a shallow-water estuarine-benthic community and upon laboratory microcosms representing the natural conditions of planktonic communities or fresh-water pond habitats.

Animal orientation and behavior investigations being supported include those involving the physical basis for the orientation of birds and other organisms during migratory activities, and the physiological mechanisms which tend to initiate migration.

When properly interpreted, data from Foundation-aided studies of fossil pollen and invertebrate animals taken from cores of lake beds and marine sedimentary deposits, should yield important additional clues to the environmental conditions and the patterns of plant and animal distribution of early geological periods, as well as reveal parameters of climatic cycles and further information on evolutionary processes of modern-day organisms.

Included at the forefront of ecological research today are investigations concerned with mechanisms governing population structure and change. At one institution a series of laboratory experiments utilizing quantitative biological models has been designed to analyze the role of intergenus, interspecific, and intraspecies competition in population phenomena. At another laboratory, rates of biological efficiency and population response of certain lower invertebrates to controlled predation, immigration, and radiation are receiving study.

Most of the combined nitrogen in the oceans is believed to be present as nitrate in the deeper waters. Although the conversion of organically combined nitrogen to nitrate usually involves nitrification by suitable marine microorganisms, the organisms responsible for the nitrification
process in coastal waters have not been isolated. One NSF-supported attack on this problem includes the development of a method for demonstration of nitrification in marine waters; an attempt to determine if autotrophic and heterotrophic microorganisms which oxidize ammonia or nitrate can be isolated from various depths in the ocean; and, examination of the significant environmental factors which may influence the rate of nitrification in these waters. Efforts to ascertain the influences which contribute to the productivity and biotic structure of fresh water habitats are being pursued as well.

In addition to that for general life history investigations, support is being provided for analyses of the responses and adaptations of plants and animals to physical conditions of the environment. Many facets of plant and animal community development and organization are also receiving attention.

With the evident increase of interest in the ecological aspects of host-parasite associations, Foundation-supported investigators are conducting a variety of studies concerning the relationships between physical and biological conditions external to the host and the composition and distribution of parasite populations.

**Genetic Biology**

The Genetic Biology program supports a variety of research projects— including preliminary and general investigations, studies of the nature of the genetic material, research in quantitative and mathematical genetics, and evolutionary studies. A portion of the program consists of studies that may be termed preliminary or general—being concerned with establishing the existence of a genetic basis for observed variation, finding new hereditary traits, and the location of genes on the chromosomes.

Investigations of the transmission, action, physico-chemical nature, and mutation of genetic material comprise about half of the research now supported by the genetics program. Much of this work is being done with microorganisms in which special phenomena of reproduction and gene transmission are employed, including such processes as genetic transformation and transduction in bacteria. The investigation of gene action includes projects on gene-enzyme relations and the study of genes and differentiation—covering such subjects as genes and biosynthesis in bacteria and fungi, the genetic basis of morphogenesis in seed plants, and sex determination in a great variety of living things ranging from microorganisms to higher plants and animals. Research on the detailed structure of genes and chromosomes is advancing along different routes that appear to be converging towards a remarkably improved understanding of the nature of genetic material. While some investigators study genetic fine structure by means of recombination due to rare crossing over between homologous chromosomes, others investigate the genetic properties of deoxyribonucleic acid (DNA) and associated substances.

There appears a reasonable hope for a break-through that will show the relationship between information acquired through one approach and that obtained by the other. Microorganisms, with their high rates of reproduction and their relatively simple chemical organization, are particularly favorable for this kind of work. Genetic control of mutation is the subject of an interesting group of projects—for example, the study of genes in maize that appear to convert their alleles into likenesses of themselves. Quantitative and mathematical genetics is the basis for another segment of active grants. A number of projects apply electronic computers to genetic problems. For instance, a recent grant supports a study in which a laboratory population of fruit flies is to be paralleled by a mock population analyzed by a high speed electronic computer; a comparison of the actual breeding results from the fly population with those obtained by the computer with the mock population should serve as a valuable test of the theoretical considerations on which the computer population is set up.

Projects on the genetic basis of evolutionary phenomena are the basis for the remaining grants made in this program. Such studies are concerned with genetic differences between species and natural populations and include investigations of chromosome and gene variation, reproductive isolation, and hybridization. Grants in this area support studies on a wide variety of animals and plants—protozoans, marine invertebrates, insects, fishes and amphibians, a few lower plants, and numerous seed plants.

**Metabolic Biology**

Studies that are being supported by the Metabolic Biology program are directed toward discovery of metabolic flow patterns in plant, animal, and bacterial systems with specific emphasis on determination of sites and mechanisms of energy coupling and on biological control of direction and rate of synthesis and breakdown of metabolites. This aspect is best exemplified by the research involved in an investigation of the biological interconversions of a very unusual, naturally occurring group of compounds referred to as "terpenes." A number of bacteria have been isolated from soil and sewage which are capable of metabolizing camphor, bornol, isobornol, terpin hydrate, menthol, menthone, limonene, carvone, pulegon, and related substances. In studying the breakdown...
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of these compounds two distinct metabolic pathways have been discovered and the intermediate products resulting from their breakdown have been studied by very recently discovered and complicated techniques utilizing vapor phase chromatography. The enzymes catalyzing the initial stages of breakdown of these compounds have been fractionated and purified to an extent that the energy relationships and mechanisms involved could be studied in considerable detail.

Included in this program are problems concerned with the purification of specific enzymes such as the enzymes involved in the metabolism of proteins, carbohydrates, lipids, amino acids, and steroids; also isolation of previously undescribed cofactors and the elucidation of the nature of specific reactants and metabolites which have been used to reveal significant results with respect to mechanisms of enzymes, catalyzed substrates, and energy coupling.

Studies on the comparative aspects of biocatalysis in microorganisms have led to the discovery of the universality of biochemical processes in many metabolic pathways and marked specificity in others. A number of projects being supported by this program have clearly indicated that the major metabolic pathways involved in living systems are similar. However, on closer examination and study of these processes, minor but significant differences in metabolic flow patterns have become apparent and these differences are being exploited for the study of mechanism of chemotherapy.

By selection of mutants or of organisms capable of specific enzyme inductions, as has been done in studies on the adaptive nature of the enzymes involved in the tricarboxylic acid cycle in microorganisms, it has been possible to study the mechanisms responsible for the specifically induced enzymes and cofactors involved in this aerobic process and to obtain information concerning energy metabolism both in the growing and non-growing cell, as well as in enzyme systems purified from cell extracts.

**Molecular Biology**

Grantees of the Molecular Biology program are concerned with protein synthesis and structure and enzyme function, nucleic acid and the translation of genetic information into specific directions for synthesis and regulation of cellular substances, and the physical and chemical nature of viruses and the mechanisms of virus infection. Others conduct research dealing with the nature of the biochemical world before and during the formation of the planet earth; the manner in which energy is transformed in living systems; and the physiological mechanisms, such as nerve conduction, muscular contraction, membrane permeability, and energy coupling.

Examples of research now under way include the following:

**Ribonuclease** is an enzyme crucial to the translation of the genetic code in deoxyribonucleic acid (DNA) into specific directions for protein synthesis via ribonucleic acid. Research is presently in progress which is attempting to correlate the configuration of ribonuclease protein chains to the properties of this enzyme.

In human blood serum there exist several genetically determined types of hemoglobin-binding proteins. It is believed that the amino-acid composition of these protein types is directly related to the particular sequence of nucleotide bases in the deoxyribonucleic acid of the genes. This relationship is being investigated with the assistance of a very useful technique for separating similar serum proteins.

Viruses are intriguing biological organisms—comparatively simple yet still showing many signs of organized, independent existence. One investigation using bacterial viruses as subject material is trying to understand the nature of virus infection of bacterial cells and, in particular, to learn the mechanism by which DNA is packed in the virus head and is propelled into the bacteria through the virus tail.

The earth and its atmosphere have not always contained the myriad of organic compounds that we observe today. Somehow these compounds developed from simpler substances which composed the earth. A speculation is that the primitive planet may have been surrounded by a mixture of methane, ammonia, water, and hydrogen. It is now known that, in a test tube, ultraviolet light or an electric spark in the presence of this mixture will be followed by amino-acid synthesis. Experiments are continuing to see whether sugar phosphates, nucleotides, and other organic compounds can be derived from simple mixtures under common physical conditions.

A basic property of the living organism is the ability to change energy to a form needed to satisfy its living processes. This is accomplished through the transfer of chemical energy stored in packets. In photosynthetic organisms these packets are derived directly from light energy; in nonphotosynthetic organisms the packets are formed as a result of the breakdown of energy rich compounds. One useful packet is known as adenosine triphosphate (ATP). ATP holds energy in its phosphate bonds which can drive biological reactions. Research projects currently
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is transformed in living systems; and the physiological mechanisms, such
as nerve conduction, muscular contraction, membrane permeability, and
in progress are investigating the mechanism by which energy liberated during metabolism is converted into the biological currency of ATP through phosphate bonds.

In recent years there has been controversy about whether the basic molecular event in muscle contraction is the internal shortening of a continuous element or whether it is the sliding motion of discontinuous elements toward each other. An attempt is being made to resolve this problem by studying the behavior of the contractile protein, myosin, in solution. The small scale methods of X-ray diffraction and optical rotation are being used to determine the character of the molecular transformations.

Refined physical techniques such as electron microscopy and microspectrophotometry now permit direct observation of changes in cellular or organelle fine structure during the course of activities in the living cell. By using a combination of physical techniques it is the aim of a current study to elucidate the functional significance of cell fine structure. Investigators are observing changes in this structure as they occur during mitosis, differentiation, and contraction.

**Psychobiology**

Grant awards in the Psychobiology program cover research in physiological and experimental psychology and in animal behavior, as well as studies in measurement and quantitative techniques as these apply to the investigation of behavior and psychology.

In the area of physiological psychology and experimental psychology, current support includes investigation of the effects of cortical stimulation on learning and retention in monkeys; the effects of localized brain damage on the responsiveness of monkeys to visual and auditory incentives; behavioral changes in cats following restricted brain lesions produced by focused ultrasonic irradiation; and the perception by humans of complex visual and auditory patterns. Also being supported are experiments in discrimination learning with the special interest in assessing the validity of current mathematical models; studies of human learning and memory under conditions of infrequent opportunity for practice; and studies of the relationships between human perception and autonomic conditioning.

Animal-behavior support covers such research as descriptive and experimental studies of mechanisms in the pairing of predatory birds; analyses of instinctive behavior in birds and other vertebrates; and studies of the social behavior of a family of ants with special reference to analyzing the development of individual behavior patterns and to identifying chemical releasers of social behavior.

Support for research dealing with measurements and quantitative techniques includes work on techniques for constructing scales of subjective estimates of sensory stimuli with a view to clarifying the relations between the psychological response and the physical stimulus.

**Regulatory Biology**

The Regulatory Biology program supports studies of integrative and regulatory processes which operate within intact cells and organisms, both plant and animal. Quantitative methods are generally used which employ the tools of chemistry and physics, but the systems under examination are exceedingly complex because of the investigator's concern for the nature of the living responsive process as such. Sometimes only parts of plants or animals are used, such as single root hairs, thin slices of organs, or isolated single cells, but always the concern is for how these findings have a referred meaning for the whole organism. Studies supported by this program also include plant and animal diseases when attention is directed to regulatory responses made within either the host or the invading organism to the pathological relationship.

Among the more complexly organized animals, the nervous and endocrine systems are the principal regulatory mechanisms which serve to control the physical and chemical nature of the internal environment; support of studies concerning these systems constitutes the major fraction of this program's activities. In mammals, much attention is directed to the hypothalamus and lower brain centers as they affect autonomic reflex functions. Highly refined methods are being employed to ablate or stimulate specific areas in the brain for the purpose of identifying nerve centers and pathways which control such body functions as blood pressure and flow, appetite and thirst, various behavior drives, and many aspects of autonomic visceral functions. Other studies in neurophysiology are concerned with the identification of receptive end organs, the reactions of individuals to environmental conditions permitting orientation to such external stimuli as polarized light, and with the relationship of light and dark periods of migratory preparation. Endocrine studies in various higher animals are devoted to the role of the pituitary gland as it is affected by the hypothalamus in regulating the reproductive cycle, and in controlling secretions of the pancreas, stomach, liver, intestine, and other digestive glands. Comparative endocrinology is represented by several projects devoted to a search among vertebrates for evolutionary changes in how hormones interact with each other and with the central nervous system to achieve autoregulation.

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The very interesting and highly publicized field of "biological clocks" receives its share of attention from the program with support for work in the area dealing with the analysis of rhythmic behavior in dozens of plants, animals, and microorganisms. Analyses of all the basic regulatory devices of these organisms are being made to explain the persistence of rhythms which exist apart from overt environmental stimuli and affect such diurnal, lunar, and animal activities as movements of plant leaves and petals, wakefulness, emergence of insects from pupae, color changes in invertebrates, feeding and reproductive activities, menstrual cycle, migration, and finally the annual cyclical activities of plants and animals too numerous to mention.

An increasingly large number of projects are being supported which isolate from the whole organism individual cells or small groups of cells for study in vitro under controlled conditions. These studies on plant and animal preparations are designed to identify carefully the physiological parameters of such general cell phenomena as permeability and active transport across cell membranes, conduction of muscle fibers, conduction along nerves, etc., when attention is directed to the living phenomenon itself rather than to the metabolic or molecular mechanisms which might underlie it.

**Systematic Biology**

Currently, the program for Systematic Biology is supporting research in various aspects of the systematics of many kinds of plants and animals, both fossil and living, and which occur in widely diverse habitats.

Insects leave almost no fossil record in rocks and their evolutionary history is imperfectly known. The best source for preserved representatives of earlier geologic epochs is the Chiapas area of Mexico where large deposits of amber, fossilized tree resin, are located. Studies of these perfectly preserved specimens embedded in the amber, comparison with modern day forms, and correlation with the geologic ages at the various sites are providing knowledge of the antiquity of modern insects and their geographic distribution.

A natural basis rather than an artificial basis for nomenclatural classification is preferable, as the latter often completely obscures biological generalizations that a natural classification will bring to light. This is illustrated by the rove beetles (family: Staphylinidae). One of its members is parasitic on mammals, while others are found in termite nests. Investigations of these beetles which inhabit societies of doryline ants (small army ants, legionary ants, driver ants) have now shown that the society comprised of ants and their associated beetles is an adaptive unit. The ants and beetles have been interdependent throughout their history, so that the two, evolving side by side, resulted in changes in one calling for changes in the other.

Recognition of the importance of marine organisms has been rapidly improving and is reflected in the various research problems under consideration. The appearance of the first two parts of the "Fishes of the Western North Atlantic" and the enthusiastic reception of this critical reclassification by both American and foreign ichthyologists has stimulated research and provided the means and impetus to advance the study of these fishes. Assistance from NSF is enabling approximately 30 ichthyologists engaged in research on soft-rayed bony fishes of North America to complete pertinent studies and thus contribute to a particular phase of this unparalleled and monumental contemporary reference. Other projects of such an environment include work on marine algae, trematode parasites, living and fossil bivalve mollusks, marine fungi, growth of sea urchins, and varied problems concerning additional groups of marine organisms.

One of the more recent methods for assisting in the accurate taxonomic determination and identification of animals is the utilization of serological techniques. Interesting data are being accumulated with regard to the inter-relationship of mammals, and studies of avian proteins, have produced unusual and informative results. Data have demonstrated that serological investigations using chromatography, electrophoretic analysis, electro-migration patterns, and other modifications have potential value as a supplementary taxonomic tool. Considerable effort is being directed along that line.

The classic approach to systematics, such as faunistic and floristic surveys, is still a useful and necessary approach to taxonomy in little known areas or poorly understood groups. Such programs are exemplified by the vascular flora of North and South Carolina, flora of Panama, Oligocene flora of the Ruby Basin in Montana (fossil forms), Arctic American mosses, and faunas of the Deadwood Formation of the Black Hills. A plant survey of the Guiana Region of South America is continuing to supply valuable material collected in an area about which almost nothing was known until recent years when several expeditions have provided much data and discovered many new and unique species. Experimental efforts are also being directed toward clarification of life histories of such forms as fishes and some invertebrates. Among the...
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Facilities for Research in the Biological and Medical Sciences

Support of research facilities was broadened during the 1960 fiscal year to include not only support of specialized facilities, such as marine and field stations, systematic biology museums and controlled environment laboratories, but also support for the development of graduate-level laboratories (renovation and new construction). Specialized facilities, those considered unique, either in their program or their locations, and not found in the usual university or college department are supported at full cost by the Foundation. Graduate research laboratories require at least 50 percent participation by the institution in the cost of the enterprise for which aid is requested.

Specialized Research Facilities

Twenty-nine grants were awarded during the year in the specialized facilities program. Although all of them help to fulfill urgent needs, a few examples will highlight the importance of this kind of aid. Among these are the grant to the University of Texas Marine Station at Port Aransas, which permits the construction of a boat basin where the Station's boats may be kept. This will greatly facilitate the work of that rapidly improving station by permitting more adequate protection of boats, saving of travel and loading time, and more efficient general operation. Grants to the Desert Research Station of the American Museum of Natural History, to the Mt. Desert Island Biological Laboratory, to the Naples Zoological Station, to the Bermuda Biological Station, to the Science Lodge of the University of Colorado, and to the Rocky Mountain Biological Laboratory will aid in the improvement and renovation of research facilities, improvement and expansion of housing facilities, improvement of access roads, and assistance in general operations of these important scientific establishments. A grant to the University of Wisconsin will aid in construction of a new and modern hydrobiological laboratory, the only such establishment in the United States. A grant to the University of California (Berkeley) will permit the construction of an animal behavior field station where animals may be readily studied under conditions simulating those of the natural habitats. Another grant to the University of California (Riverside) has allowed the retention of a large tract of desert terrain as a natural preserve for study of biological phenomena under arid conditions. A grant to the New York Botanical Garden will aid in construction of a building to adequately house one of the world's best and most complete botanical libraries. Another grant was to the Communications Research Institute, St. Thomas, V.I., which will permit the construction of a laboratory for research on communication phenomena in porpoises.

Graduate Research Laboratories

Forty-two grants to graduate research laboratories—most of them being for renovation or rehabilitation of existing space—made during the year will result in improvement of thousands of square feet of research laboratory space. Equally important are those grants which will permit adequate equipping of new laboratories which are being constructed with funds from other sources. These, as well as the few grants for construction of new laboratory buildings, greenhouses, etc., will help to provide the much needed additional space for enlarged staffs and their research projects.

Genetic Stock Centers

The importance of genetic stock centers in backing up research is potentially great. Such centers reduce the time and funds that individual workers would otherwise need to spend on stock maintenance. They also insure that valuable genetic material will be maintained and available when needed, rather than being lost through neglect or the decision to discard due to lack of space, time, etc.

Currently active grants support four such stock centers: (1) a Drosophila stock center at the California Institute of Technology; (2) a mouse mutant collection at the Jackson Memorial Laboratory; (3) a maize stock center at the University of Illinois; and (4) a center for Neurospora and other fungi at Dartmouth. Maintenance of stocks of genetically less well known organisms is also being supported—algae at Indiana University, Paramecium caudatum at the University of Miami, and Chinese hamsters at the Children's Cancer Research Foundation, Boston.

DIVISION OF MATHEMATICAL, PHYSICAL, AND ENGINEERING SCIENCES

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Current Research Support

The Astronomy program supports research in all areas of astronomy, ranging from stellar spectroscopy through studies of primary cosmic
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supports research dealing with the development of improved instrumentation such as image amplifiers and more sensitive radio receivers.

Because of the present and probable future impact of U.S. space programs on astronomical research, the Foundation is considering how best to distribute its support. Within limitations of its budget, it will, of course, continue to support research at ground-based observatories and laboratories. In the area of space programs, it will generally not support the construction or operation of rocket launchers or space vehicles. NSF will, however, encourage astronomers in the development of ideas and instrumentation which make the best possible use of the national capability for astronomical observatories in space.

It will also endeavor to provide high-grade observing facilities for research and training purposes by young astronomers whose number is sharply increasing. See "Facilities" section on page 52 for other information on national observatories.

**Atmospheric Sciences**

Taken as a whole, the earth's atmosphere presents problems that require the services of nearly all branches of science. In the past, largely because of the extreme complexity of the subject, meteorologists and other scientists concentrated on the more tangible areas, such as temperature, wind, and moisture statistics, rather than trying to derive the properties of the atmosphere from fundamental physical parameters. The Atmospheric Sciences program helps bring the scientific disciplines of physics, chemistry, mathematics, etc., to focus on the interdisciplinary problems encountered in the study of the atmosphere. Research topics are many and varied, and include many features of the fundamental entities of energy, heat, mass, and motion.

Because of the importance of the sun's role in the circulation of the atmosphere, the Foundation is supporting research dealing with the effect of small and large variations in solar activity on the earth's circulation, climate, and daily weather.

Another research project is seeking to provide quantitative estimates of the exchanges of heat and water vapor between the sea surface and the atmosphere, and to relate these to the development of large-scale weather systems and their motion.

The transport of thermal energy throughout the troposphere is a subject of investigation. Thorough studies of this topic require the development of equations suitable for numerical integration which will yield the convective heating or cooling rate throughout the troposphere, and the testing of these results with balloon-borne radiation measurements.

The higher atmosphere is also a subject of investigation. The IGY and the advent of satellites have generated interest in the extra-terrestrial nature of many atmospheric phenomena. The origin, propagation, and interactions of cosmic rays and auroral particles are some of the subject areas being studied. Other upper-atmosphere investigations include the application of fluid mechanics to ionospheric physics; the three-dimensional field of motion, temperature, moisture, and ozone in and above the stratosphere; and geomagnetic fluctuations in the ionosphere.

More familiar topics, such as cloud and precipitation physics, are always of interest to the meteorological scientist. Research projects in these areas include studies ranging from cloud-chamber measurement of the absorbing ability of air-borne particles through the physical and chemical properties of condensation nuclei to the fire-starting characteristics of lightning storms. Several projects of these types, classified as weather-modification research, are also supported and monitored by this program and are reported on in detail in a separate annual report to the President and the Congress.

**Chemistry**

The Chemistry program supports research primarily in the fields of organic, inorganic, physical, and analytical chemistry.

In the field of organic chemistry considerable activity has continued on studies of the structure and total synthesis of natural products. A four-year research program has culminated in the total synthesis of chlorophyll, the green coloring matter of plants. (See page 66.) The structure and synthesis of this complex material has been the subject of research for more than a half-century. In two independent studies, pentacyclic triterpenes, such as hopane, have been prepared by total syntheses for the first time. Podocarpic acid, the chief constituent of pine oil, has also been synthesized in the laboratory. The structure of a very complex alkaloid, gelsemine, which has a hexacyclic structure, has been established in a Foundation-supported research program.

Small-ring compounds, hitherto considered to possess too much strain to permit isolation, have now been synthesized. These include benzo-cyclobutene, naphthal[b]cyclobutene, 1,2-diphenylcyclobutene and diphenylcydobutenedione. These compounds are of great interest because the four-membered rings are strained to the same extent as cyclobutadiene, which has defied isolation.

The trend toward physical-organic chemistry studies has continued with numerous investigations on rates, kinetics, and reaction mechanisms. Modern physical tools, methods, and instrumentation, such as nuclear-magnetic resonance, electron-paramagnetic resonance, and gas chroma-
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The absolute configuration of compounds is receiving an increasing amount of attention. Concepts of conformational analysis and the use of optical rotatory dispersion curves have been very useful in establishing the exact stereochemical configurations of groups attached to a particular atom.

Studies on the chemistry of divalent carbon is very much concerned now with questions of distinguishing between carbenes and methylene and whether these entities are in a singlet state or a triplet state in particular reactions.

In analytical chemistry a new method has been developed for determining deuterium by means of a simple gas chromatographic technique. Investigations are underway to extend the utility of the rotated dropping-mercury electrode to permit it to function properly in non-aqueous media. Increasing emphasis is being placed on the application of gas chromatographic techniques to inorganic compounds.

In physical chemistry, molecular-structure determination, primarily by spectroscopic methods, is an important area of research support. Nuclear magnetic resonance studies of organic and inorganic compounds and reaction intermediates (such as free radicals) have become increasingly popular and important. Electron-paramagnetic resonance and infrared-spectroscopy studies of a variety of compounds and intermediates have been initiated. Classical kinetic studies are being conducted, primarily directed at reaction-mechanism determination. Thermodynamic investigations are being carried out on solutions (organic and inorganic systems) as well as pure compounds, using highly refined and precise calorimeters. Some of these studies are at temperatures approaching 0° K. A resurgence of interest in theoretical quantum mechanical calculations is taking place in a number of laboratories throughout the country in an effort to calculate atomic and molecular properties.

Research in inorganic chemistry is becoming more theoretical in nature, for example, the application of the crystal field theory to inorganic complexes. Research support of boron compounds is increasing at a rapid rate. Reaction mechanisms, structure determinations, and preparative inorganic chemistry of boron compounds are areas of particular interest. Transition elements and properties of optically active complex inorganic compounds are attracting considerable attention. Increased emphasis is being given to the study of inorganic compounds at high temperatures.

Earth Sciences

In the Earth Sciences program, support is provided for geochemistry, geology, geophysics, and oceanography. Probably the most significant projects currently being supported by this program are: crustal studies dealing with the structure of the earth's crust through the combined use of seismology, gravity measurement, and geology; studies of ocean currents; studies of the carbon-dioxide problem concerned with the equilibrium of CO2 between the atmosphere and the ocean and with measurement of the carbon-14 content of ocean carbonates to trace turnover rates and circulation in the oceans; and feasibility studies and site surveys for Project Mohole, the attempt to drill a hole through the earth's crust and into the mantle.

Project Mohole, named for the Mohorovicic discontinuity located between the crust of the earth and the mantle, gives promise of great scientific rewards by providing much knowledge of the materials of the crust and the mantle. The hole will be drilled in the deep ocean because the crust there is much thinner than that underlying the continents. Complete cores of deep-sea sediments will give much history of the oceans and the evolution of life. The first phase will consist of drilling a series of experimental holes using an existing barge to test engineering calculations of deep-water drilling and to perfect positioning techniques for control of barge location.

Engineering Sciences

Along a broad front, the Engineering Sciences program continues to recommend research support for those projects which will provide either new knowledge concerning basic physical principles related to engineering or generalizations that reflect better understanding or more realistic prediction of the behavior of systems. In addition to the usual fields of engineering, the support picture is continually being broadened to include projects in rapidly developing fields such as those introduced by the advent of the space age, and fields unusual to engineering such as linguistics, learning machines, and even to areas such as biophysics of different land and sea fauna.

One of the more active areas of research support has been the field of kinetics and rate reactions largely through chemical engineering. In spite of the desirability of attaining steady-state processes, the engineer is faced with problems of both instability and nonlinearity in studying natural phenomena, thus making the study of transient-rate reactions a very important one. Typical is a study of rates of gas absorption in water at contact periods much less than a second, taking into consideration unsteady state diffusion, boundary conditions, and thermodynamics.
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The need for additional basic research in the heat-transfer area has been manifest in many new engineering developments, particularly in space flight and attempts to control nuclear fusion. In the former area, great emphasis exists on thermal-radiation studies since heat transfer takes place primarily through this mechanism in outer space. Furthermore, rocket motors and unconventional power plants for propulsion in space require high-temperature operation which results in substantial heat exchanges by radiation. On the other hand, developments in controlled nuclear fusion are directly dependent on further basic knowledge of convection and back-diffusion-transfer mechanisms. Pertinent to these areas are research grants for basic studies in the spectral absorptivities, transmittivities, and emissivities of various gas mixtures over a wide range of temperatures and pressures; heat transfer and flow phenomena in swirling flow; and conversion of solar energy to power.

Significant engineering developments in aeronautics, unit operations, turbomachinery, and many other fields are greatly dependent upon research being carried out in the general area of fluid mechanics. This area of research is exceedingly broad and research projects cover subjects such as turbulence, boundary-layer transition from laminar to turbulent flow.

The advent of the space age has stimulated a great deal of interest in studies involving the drag and heating of meteors, satellites, and space vehicles moving through low-density atmospheres at hypersonic speeds. Most of the research being done on these problems is supported by agencies whose missions are oriented toward space. However, several interesting studies were initiated this fiscal year under Foundation support. For example, grants were awarded for studies in free-molecule transfer processes at high speed, energy-transfer and momentum-transfer processes at solid surfaces exposed to high-speed free-molecule flow, emission and absorption properties of plasma fields under hypersonic flow conditions, magnetic-boundary layers, and magnetic shock.

In a different vein of growing interest are areas of overlap between physical, biological, and social sciences. Problems may range over a wide spectrum, from small-scale problems in biology, such as the bio-physics of bird flight, to large-scale socioregional problems such as basic transportation problems.
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In this group are included research on the properties of light nuclei with energy levels and other nuclear properties being determined by analysis of nuclear reactions; on measuring properties of nuclear levels using mostly deuteron-induced reactions with emphasis on determination of the finer structure of nuclear energy level schemes; on precision energy measurements of nuclear gamma rays using a 2-meter and a 6-meter, bent-crystal spectrometer; on measurements of nuclear-magnetic moments using newly developed nuclear-alignment methods for making additional nuclei susceptible to measurement; and on measurement of nuclear-excited state lifetimes using the continuous bremsstrahlung from an electron accelerator.

For investigation in the photonuclear reactions and the associated "giant resonances," the Foundation has made available a grant for a tandem Van de Graaff accelerator.

On the question of improving our knowledge of the structure of liquids, Foundation-grant recipients were able to make a number of advances. Of particular interest is the work utilizing the pseudo atom, positronium. (See page 72.)

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

Facilities support by this division during 1960 totaled $9.5 million and included aid for two national observatories, a national center for atmospheric research, specialized research facilities at universities, and graduate research laboratories.

National Observatories and Centers

Facilities support was provided for the National Radio Astronomy Observatory and the Kitt Peak National Observatory. A new National Center for Atmospheric Research was established by a contract with the University Corporation for Atmospheric Research signed on June 20, 1960.

1. National Radio Astronomy Observatory

A total of $950,000 was allocated to the contract under which Associated Universities, Inc., operates the observatory at Green Bank, W. Va., including $50,000 specifically earmarked for strengthening the library. Total funds obligated through fiscal year 1960 were $10,430,000.

A significant milestone was passed when on July 1, 1959, Dr. Otto Struve joined the observatory as its first permanent director. During the year, the central section of the laboratory and the complete residence hall were finished and occupied. The 84-foot telescope was in operation throughout the year. The only major construction item which has been funded and is not yet complete is the 140-foot telescope. Unofficial estimates indicate that this telescope will be completed in 1961.

A specialized radio telescope of somewhat unusual design was completed and began operation toward the end of March 1960. Known familiarly as "Little Big Horn," it is a horn antenna 120 feet in length, fixed in position so that it can observe the strong radio source in Cassiopeia once each day. This type was chosen because the energy it collects can be calculated precisely from its size. It is used to measure accurately the energy of incoming radio waves, thus providing a calibrated source in the sky that all radio astronomers can use as a standard. (See photograph, p. 29.)

2. Kitt Peak National Observatory

An additional $900,000 was provided in fiscal year 1960 for operations and improvements at the observatory, located near Tucson, Ariz., which is operated by the Association of Universities for Research in Astronomy, Inc. (AURA) on contract with NSF. In addition, a second grant ($252,500) was made to AURA for the space telescope design study program. To date $8,445,000 has been obligated under the main contract, and $412,000 granted for the space telescope study.

The 36-inch telescope and dome, and dining-assembly hall, the office building, dormitory, and shops were completed this year on Kitt Peak; the first third of the city laboratory building in Tucson was finished. Completion of the 84-inch telescope dome is expected in October 1960, but the telescope itself cannot be expected to be in full operation for several years. The 36-inch telescope with its associated spectrophotometers is in operation.

Construction of what will be the world's largest solar telescope is to begin at Kitt Peak in late 1960. This 300-foot focal-length instrument will form solar images as large as 34 inches in diameter. The telescope will be a large building with an 80-inch mirror mounted at the top to reflect sunlight to a 60-inch parabolic mirror at the bottom of a 490-foot shaft bored into the mountain. From this point light will be reflected an additional 280 feet to a 48-inch mirror and thence to an underground observing room. (See illustration, p. 28.)
theoretical model of the nucleus existed. Within the past decade this situation has improved to the point where now the shell model, the collective model, and finally the unified model of the nucleus provide a useful framework for interpretation of the data. In order to obtain critical data for guidance in the further development of these models, the Foundation supported a number of experimental investigations noted for their precision measurements.

In this group are included research on the properties of light nuclei with energy levels and other nuclear properties being determined by analysis of nuclear reactions; on measuring properties of nuclear levels using mostly deuteron-induced reactions with emphasis on determination of the finer structure of nuclear energy level schemes; on precision energy measurements of nuclear gamma rays using a 2-meter and a 6-meter, bent-crystal spectrometer; on measurements of nuclear-magnetic moments using newly developed nuclear-alignment methods for making additional nuclei susceptible to measurement; and on measurement of nuclear-excited state lifetimes using the continuous bremsstrahlung from an electron accelerator.

For investigation in the photonuclear reactions and the associated "giant resonances," the Foundation has made available a grant for a tandem Van de Graaff accelerator.

On the question of improving our knowledge of the structure of liquids, Foundation-grant recipients were able to make a number of advances. Of particular interest is the work utilizing the pseudo atom, positronium. (See page 72.)

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

Facilities support by this division during 1960 totaled $9.5 million and included aid for two national observatories, a national center for atmospheric research, specialized research facilities at universities, and graduate research laboratories.

National Observatories and Centers

Continued support was provided for the National Radio Astronomy Observatory and the Kitt Peak National Observatory. A new National Center for Atmospheric Research was established by a contract with the University Corporation for Atmospheric Research signed on June 20, 1960.

1. National Radio Astronomy Observatory

A total of $950,000 was allocated to the contract under which Associated Universities, Inc., operates the observatory at Green Bank, W. Va., including $50,000 specifically earmarked for strengthening the library. Total funds obligated through fiscal year 1960 were $10,430,000.

A significant milestone was passed when on July 1, 1959, Dr. Otto Struve joined the observatory as its first permanent director. During the year, the central section of the laboratory and the complete residence hall were finished and occupied. The 84-foot telescope was in operation throughout the year. The only major construction item which has been funded and is not yet complete is the 140-foot telescope. Unofficial estimates indicate that this telescope will be completed in 1961.

A specialized radio telescope of somewhat unusual design was completed and began operation toward the end of March 1960. Known familiarly as "Little Big Horn," it is a horn antenna 120 feet in length, fixed in position so that it can observe the strong radio source in Cassiopeia once each day. This type was chosen because the energy it collects can be calculated precisely from its size. It is used to measure accurately the energy of incoming radio waves, thus providing a calibrated source in the sky that all radio astronomers can use as a standard. (See photograph, p. 29.)

2. Kitt Peak National Observatory

An additional $900,000 was provided in fiscal year 1960 for operations and improvements at the observatory, located near Tucson, Ariz., which is operated by the Association of Universities for Research in Astronomy, Inc. (AURA) on contract with NSF. In addition, a second grant ($252,500) was made to AURA for the space telescope study program. To date $8,445,000 has been obligated under the main contract, and $412,000 granted for the space telescope study.

The 36-inch telescope and dome, and dining-assembly hall, the office building, dormitory, and shops were completed this year on Kitt Peak; the first third of the city laboratory building in Tucson was finished. Completion of the 84-inch telescope dome is expected in October 1960, but the telescope itself cannot be expected to be in full operation for several years. The 36-inch telescope with its associated spectrophotometers is in operation.

Construction of what will be the world's largest solar telescope is to begin at Kitt Peak in late 1960. This 300-foot focal-length instrument will form solar images as large as 34 inches in diameter. The telescope will be a large building with an 80-inch mirror mounted at the top to reflect sunlight to a 60-inch parabolic mirror at the bottom of a 400-foot shaft bored into the mountain. From this point light will be reflected an additional 280 feet to a 48-inch mirror and thence to an underground observing room. (See illustration, p. 28.)
This instrument will enable researchers to study the sun in much
greater detail than has hitherto been possible, increasing substantially
their meager knowledge of the star that keeps our planet alive.

The satellite-telescope project has been moving forward through the
feasibility-study and preliminary-design stages. Design calculations on
the vacuum spectrograph have been completed. A model of the astro-
guider for the telescope has been designed and is under construction.
Preliminary sketches have been drawn for an addition to the city labora-
tory required for the satellite project.

In March 1960, Dr. Aden Meinel resigned as director of the ob-
servatory in order to devote more time to research and to the satellite-
telescope program. He was succeeded by Dr. C. D. Shane, president of
AURA, on a temporary basis pending recruitment of a permanent Di-
rector. On June 8, 1960 the appointment of Dr. N. U. Mayall as
permanent director of the observatory was announced; he assumed his
new duties October 1, 1960. Dr. Mayall had a distinguished record of
accomplishment as a member of the research staff at the Lick Observa-
tory, where he had served since 1924.

3. National Center for Atmospheric Research

Congress appropriated $500,000 in fiscal year 1960 in response to a
Foundation request for funds to study further and to plan for a national
institute for atmospheric research. This request was based on the pro-
posal, formulated by the University Committee (now Corporation) for
Atmospheric Research, that a major institute be established.

Careful review and evaluation of this proposal by the National Sci-
ence Board and the staff of the Foundation has culminated in a plan
for a new Center, which will be a unique organization, and in no sense
"just another laboratory."

First, the Center will be an intellectual focal point where leading sci-
entists with diverse backgrounds can concentrate their talents on atmos-
pheric problems. Its personnel will include a permanent staff and an
approximately equal number of visiting scientists from this country and
all over the world. The Center will be interdisciplinary in character,
bringing the resources of engineering, chemistry, physics and mathe-
matics to bear on atmospheric science. NSF looks to the Center to pro-
vide a bold imaginative approach to the vast problems of the atmosphere.

Second, the Center will be a research-planning center for large-scale
programs that cannot be undertaken by individual groups. The Founda-
tion expects that the Center will use ad hoc teams of university scientists
to plan such major programs. While providing an intellectual base to
support major atmospheric research, the Center will in no way direct re-
search in universities. Rather it will stimulate the planning of joint

research-operations in which each group involved will participate accord-
ing to its interest and talents.

Third, the Center will be a research-operations center. For each
cooperative research program undertaken, the Center will synchronize
and coordinate the research operations, which may be of a world-wide
nature. The Center will arrange for and schedule necessary airplane
flights, rocket launching, and other complex operations, serving as a
scientific "Combat Information Center" for each major program. In
these operations maximum use will be made of existing Government
facilities insofar as they can be made available by the responsible agencies.

It is intended to let the facilities of the Center grow as the program
develops and the needs become clear. Because its activities will be
nationwide and probably worldwide, all facilities may not be located at
a single place. Some of the necessary vehicle-launching sites for high-
altitude balloons and rockets must of necessity have special locations.
There will certainly be a central interdisciplinary laboratory and office
for the staff, but operational facilities may be widely dispersed.

The Foundation plans to provide a basic core of financial support for
the operation of the Center and additional funding as required for major
cooperative programs. The initial contract was negotiated and signed
with the University Corporation for Atmospheric Research on June 20,
1960. The contract is of 5 years' duration and $500,000 was obligated
to launch the new activity. Dr. Walter Orr Roberts, formerly Director
of the High Altitude Observatory in Boulder, Colo., has been appointed
director of the new Center.

Specialized Research Facilities

Grants under this program are awarded primarily for construction.
1. University Nuclear Research Facilities

Grants totaling $1.5 million were made for nuclear research reactors—
five were to institutions for improvements to existing reactors or reactors
under construction and two for new reactors. An additional grant of
$1 million was made for construction of a tandem 10 Mev Van De Graaff
accelerator.

2. University Computer Facilities

Computers-facilities support consisted of grants to six universities at a
cost of $1.7 million. In addition to this support for major computer
facilities, 16 grants totaling $842,000 were made through the mathe-
matical sciences program for direct support of computer centers—rental
of computers, improvements in existing centers, operating costs, acquisi-
tion of small computers, etc.
This instrument will enable researchers to study the sun in much greater detail than has heretofore been possible, increasing substantially their meager knowledge of the star that keeps our planet alive.

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First, the Center will be an intellectual focal point where leading scientists with diverse backgrounds can concentrate their talents on atmospheric problems. Its personnel will include a permanent staff and an approximately equal number of visiting scientists from this country and all over the world. The Center will be interdisciplinary in character, bringing the resources of engineering, chemistry, physics and mathematics to bear on atmospheric science. NSF looks to the Center to provide a bold imaginative approach to the vast problems of the atmosphere.

Second, the Center will be a research-planning center for large-scale programs that cannot be undertaken by individual groups. The Foundation expects that the Center will use ad hoc teams of university scientists to plan such major programs. While providing an intellectual base to support major atmospheric research, the Center will in no way direct research in universities. Rather it will stimulate the planning of joint research-operations in which each group involved will participate according to its interest and talents.

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It is intended to let the facilities of the Center grow as the program develops and the needs become clear. Because its activities will be nationwide and probably worldwide, all facilities may not be located at a single place. Some of the necessary vehicle-launching sites for high-altitude balloons and rockets must of necessity have special locations. There will certainly be a central interdisciplinary laboratory and offices for the staff, but operational facilities may be widely dispersed.

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3. Oceanographic Research Vessel

The award of a $3 million grant to the Woods Hole Oceanographic Institute for building and outfitting a general-purpose, 175-foot, oceanographic-research vessel was announced during the 1960 fiscal year. A committee including representatives of the Navy, Maritime Administration, and the Fish and Wildlife Service has been formed to advise the Foundation on decisions concerning the design and construction of the ship.

Graduate Research Laboratories

Support for graduate research laboratories, as in the case of the Biological and Medical Sciences Division, were awarded on a matching basis for construction of new facilities, renovation, rehabilitation of existing space, and for equipping of new laboratories constructed with non-NSF funds. Seventy-two grants for approximately $1 million were activated in 1960.

OFFICE OF SOCIAL SCIENCES

Fiscal year 1960 was the first full year of operation of the Office of Social Sciences, formally established in December 1958. This office replaces the previous Social Sciences Research Program and represents a forward step in the development of Foundation activities in the area. The year has been characterized by continuing steady growth in number of proposals received, in number of grants made, and in the variety of research for which support was granted.

The role of the National Science Foundation in the basic research effort of social science is rapidly growing in importance. As previously forecast, the effects of private foundation policy on support of basic social science research are now beginning to become apparent. Decisions made several years ago by the private foundations led to reduced emphasis on social science research (contrasted to support for social welfare, applied and service activities). The effect is showing up in the form of heavier demands on NSF by first rate investigators as grants from private sources run out.

Current Research Support

Anthropological Sciences

The Anthropological Sciences program includes basic research in archaeology, physical and cultural anthropology, linguistics, and related fields. Perhaps the outstanding positive effect of the Foundation’s efforts in the period 1954-60 has been the long-term support made available for thorough exploration of important problems in cultural development. An example is a coordinated investigation of the cultural and environmental circumstances of the development of village agriculture which has involved archaeological, geological, botanical, and zoological research. This program on the critical period of human development which saw the transition from food collection to food production is still continuing.

Work is in progress on a wide variety of anthropological problems including detailed study of the physical characteristics of Swiss migrants to the United States and their kin in Switzerland to test the hypothesis that migrants are not a random sample, biologically, of their ancestral stocks. Evidence is accumulating that various social and cultural factors lead to a certain degree of inadvertent selection for biological characteristics among migrants. Also underway are studies of socio-cultural characteristics and change in Mexico, Africa, Oceania, Alaska, and other areas. A group of people in Eastern Panama, the Choco, and Mainland Cuna, were identified as early as 1519 but the literature on these people is unusually sparse, indicating that they have been notably adept at avoiding contact with foreigners. As a result they have not been systematically studied by contemporary anthropologists. Like other relatively small societies in technologically undeveloped areas on the fringes of westernized areas, they are now in danger of being overwhelmed and losing their isolation. The program is supporting an effort to gain first hand knowledge of this group and its interaction with modern society before the situation changes irrevocably and the information becomes unavailable.

Studies of language are under way among the Algonquin Indians who speak Algonaki dialect and among the people of Fiji. An attempt is being made in northern California to relate techniques for dating linguistic phenomena with techniques for dating archaeological materials. Archaeological excavations and surveys to study extinct cultures and cultural development are being conducted in the United States, Mexico, Middle and South America, Alaska, Europe, Western Asia, and Africa. In Africa a little known area of Northern Rhodesia, which promises to yield information on the technological and economic adjustments made by hunters and gatherers to post-Pleistocene environments, has been selected for intensive study. Owing to favorable soil conditions in the area, it may be possible to recover organic materials which would shed more light on cultural adaptations than could the recovery of stone tools alone. There is evidence that tools found in archaeological contexts duplicate devices still in use and the findings will be correlated with ethnographic background on the current inhabitants. A project in Peru reverses this approach—as an addition to a long-term social-antrop
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A variety of problems connected with attitude formation and change are under study. Support has been given to the development of mathematical techniques for scaling attitudes and opinions and to experimental studies of the variables involved in attitude change. One investigator is experimenting on ways of inducing both readiness for, and resistance to, attitude change. Early results tentatively indicate that an individual's attitudes or beliefs can be strengthened and his resistance to arguments directed against his beliefs can be increased, if he is exposed to a mild form of these opposing arguments before he is engaged in full-scale defense of his views against strong arguments. Another project is testing the effects of uncertainty, importance, and commitment upon voluntary exposure to information. It is hypothesized that people will seek information on alternative courses of action in relation to the degree of uncertainty they have about these courses.

Individual and group decision-making are being studied in several ways. A project under way is concerned with identifying measurable individual traits which enter into decision-making and relating these to the mathematical formulation of the theory of games. Another is examining the parameters of risk-taking as part of the development of an empirical theory about how people make decisions in situations where elements of doubt exist or where there is a high risk factor involved. The differential use of information under different conditions of small group structure is also being investigated, as is choice behavior in conflict situations where both the goal and the means have social implications.

The advent of the electronic computer promises to enlarge the social scientists' opportunity to manipulate complex systems and to understand better their systemic properties through constructing models of social or economic processes, fitting actual or estimated parameters, and then trying out a variety of experiments on the computer. Simulation studies are currently being supported on such diverse social processes as settlement and migration, conflict, and public discussion and choice.

Economic Sciences

The electronic computer has not only had an important effect on the kinds of experimentation performed in sociology; it has opened new avenues of investigation to economists. The Economic Sciences program, primarily econometric in emphasis, has supported computer studies of business-cycle analysis, international trade transactions, and economic behavior at the level of the individual consumption unit in addition to methodological research on such problems as the applicability of Fourier Analysis to economic time series, the testing of the concept of distributed lags, and improved methods of input-output analysis. Other areas of active research interest in economics include the economics of research and development. One project is investigating the relationships among technological change, research expenditures, and resource requirements, using agriculture as the case study. An effort is being made to determine whether regional differences in the rate of technological change can be related to regional distribution of agricultural research and education expenditures. Another project is investigating the basic conditions
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within a business corporation which provide incentives for efficiency in research and development and inquiring into the conditions necessary for efficiency in research as compared to those needed for efficiency in production.

Other areas of economic theory under investigation include studies of capital accumulation, allocation of resources, and refinement of the mathematical statement of a general equilibrium theory of the competitive economy. Two current projects involve collaboration of economists and psychologists on experimental studies of bargaining, risk-taking, and decision making in economic contexts.

The field of economic and social geography, supported under this program, also has an interdisciplinary aspect. A topic such as the geography of famine in certain African areas has anthropological, as well as economic and geographic interest. A study of Asian urbanization will have important sociological implications and yet another project in economic geography involves computer techniques of simulation.

**History and Philosophy of Science**

The History and Philosophy of Science program supports basic research dealing with all the sciences—life, physical, and social. In the philosophy of science, grants made in fiscal year 1960 supported studies of the applications of symbolic logic to problems raised by developments in probability theory and psychometrics, the logic underlying physical problems of measurement in physics, and the concepts of physical meaningfulness and statistical meaningfulness. Research in the history of science may take the form of monographic studies of individuals, scientific expeditions, or special topics in science; or the research may result in broad studies of main currents in the development of scientific thought. The concepts developed from the wider perspective often provide the intellectual framework for the monographic research. The Foundation has supported research of both types in its program in the expectation that a balanced program will maximize progress.

Examples of the wide range of activities under way are a study by Charles Darwin's contribution to the study of ecology, a topic which has been very much overshadowed by the profound interest of scientists in Darwin's evolutionary studies; and a history of the Hayden Survey, an event of critical importance in the exploration, development, and scientific investigation of the American West. A mathematician is being supported in his studies on the early history of probability; he will examine the 14th- and 15th-century manuscripts on commercial arithmetic and on games which are the beginning of probability theory and study intensively the 19th century treatises on the subject. Other topics include American science in the age of Jefferson, Arabic contributions to logic, and the history of the adaptation of thermodynamic concepts to chemistry.

**OFFICE OF SPECIAL INTERNATIONAL PROGRAMS**

**U.S. ANTARCTIC RESEARCH PROGRAM**

**Program Operation**

The geophysical research conducted during the International Geophysical Year in the Antarctic, up to that time a relatively unexplored region that received special emphasis under the program, proved of such significance that plans were made to continue Antarctic research on an international scale following the IGY. To assume the international planning role, the Special Committee for Antarctic Research (SCAR) was established by the International Council of Scientific Unions. This Committee, initially composed of representatives from the 12 nations which conducted programs in the Antarctic as part of the IGY, makes broad international program recommendations on the scientific work needed in the region.

Following a U.S. Government policy decision to continue operations in Antarctica beyond the winter of 1958–59 on a basis consistent with the U.S. national interest, the National Science Foundation was designated as the agency of Government to coordinate U.S. scientific programs in the region, and the Department of Defense was named the agency to provide logistic support to such programs.

The six-station network in the Antarctic maintained by the United States during the IGY was reduced to a four-station network: The Pole Station, Byrd Station, the Naval Air Facility at McMurdo, and Hallett Station—the latter having a jointly operated program with New Zealand. The U.S. IGY Little America Station was shut down at the close of the IGY. Eleven of the 12 nations which conducted research in the Antarctic during the IGY are now continuing scientific programs there. Measures to safeguard the use of Antarctica for peaceful purposes only and to insure the freedom of scientific investigations in the region were formulated during the past year by representatives of the 12 nations into the
within a business corporation which provide incentives for efficiency in research and development and inquiring into the conditions necessary for efficiency in research as compared to those needed for efficiency in production.

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The field of economic and social geography, supported under this program, also has an interdisciplinary aspect. A topic such as the geography of famine in certain African areas has anthropological, as well as economic and geographic interest. A study of Asian urbanization will have important sociological implications and yet another project in economic geography involves computer techniques of simulation.

History and Philosophy of Science

The History and Philosophy of Science program supports basic research dealing with all the sciences—life, physical, and social. In the philosophy of science, grants made in fiscal year 1960 supported studies of the applications of symbolic logic to problems raised by developments of probability theory and psychometrics, the logic underlying physical problems of measurement in physics, and the concepts of physical meaningfulness and statistical meaningfulness. Research in the history of science may take the form of monographic studies of individuals or special topics in science; or the research may result in broad studies of main currents in the development of scientific thought. The concepts developed from the wider perspective often provide the intellectual framework for the monographic research. The Foundation has supported research of both types in its program in the expectation that a balanced program will maximize progress.

Examples of the wide range of activities under way are a study on Charles Darwin's contribution to the study of ecology, a topic which has been very much overshadowed by the profound interest of scientists in Darwin's evolutionary studies; and a history of the Hayden Survey, an event of critical importance in the exploration, development, and scientific investigation of the American West. A mathematician is being supported in his studies on the early history of probability; he will examine the 14th- and 15th-century manuscripts on commercial arithmetic and on games which are the beginning of probability theory and study intensively the 18th century treatises on the subject. Other topics include American science in the age of Jefferson, Arabic contributions to logic, and the history of the adaptation of thermodynamic concepts to chemistry.

OFFICE OF SPECIAL INTERNATIONAL PROGRAMS
U.S. ANTARCTIC RESEARCH PROGRAM

Program Operation

General

The geophysical research conducted during the International Geophysical Year in the Antarctic, up to that time a relatively unexplored region that received special emphasis under the program, proved of such significance that plans were made to continue Antarctic research on an international scale following the IGY. To assume the international planning role, the Special Committee for Antarctic Research (SCAR) was established by the International Council of Scientific Unions. This Committee, initially composed of representatives from the 12 nations which conducted programs in the Antarctic as part of the IGY, makes broad international program recommendations on the scientific work needed in the region.

Following a U.S. Government policy decision to continue operations in Antarctica beyond the winter of 1958-59 on a basis consistent with the U.S. national interest, the National Science Foundation was designated the agency of Government to coordinate U.S. scientific programs in the region, and the Department of Defense was named the agency to provide logistic support to such programs.

The six-station network in the Antarctic maintained by the United States during the IGY was reduced to a four-station network: The Pole Station, Byrd Station, the Naval Air Facility at McMurdo, and Hallett Station—the latter having a jointly operated program with New Zealand. In addition to operating these four stations, the United States agreed to supply scientific personnel and equipment under cooperative arrangements with other countries at the following stations: the Wilkes Station, formerly a U.S. station, now in the custody of Australia, and the Ellsworth Station, a U.S. station during the IGY, now in the custody of Argentina. The U.S. IGY Little America Station was shut down at the close of the IGY.

Eleven of the 12 nations which conducted research in the Antarctic during the IGY are now continuing scientific programs there. Measures to safeguard the use of Antarctica for peaceful purposes only and to insure the freedom of scientific investigations in the region were formulated during the past year by representatives of the 12 nations into the
Antarctic Treaty, which, as of July 1, 1960, had been ratified by 6 of the countries.

**Program Administration**

To undertake the detailed problems of coordinating a program of Antarctic research, the National Science Foundation established during 1958 the U.S. Antarctic Research Program under the Office of Special International Programs. Because it crosses the lines of many scientific disciplines and because it involves an exceedingly remote geographic area, the Antarctic Research Program must in one sense be a "package" program.

As for any other application for a Foundation grant, research proposals for Antarctic research received from governmental agencies, universities, and other institutions are evaluated on the basis of scientific merit through suitable review; selected to assure a balanced program; and supported to the extent of available funds and logistic support. Grantees must not only be provided with funds for research, but also travel accommodations, living space, and the necessary scientific facilities. Considerable liaison work with the Naval Support Force is necessary, therefore, to arrange for the logistic needs of each grantee. In addition, many grantees must work in cooperation with scientists of other nations. The liaison required with these other countries to assure such cooperative operations is carried out by the Foundation's staff in consultation with the Department of State.

Two groups serve in an advisory capacity to the U.S. Antarctic Research Program. Broad program objectives for this country, recognizing the recommendations of the SCAR, are considered by the Committee on Polar Research of the National Academy of Sciences and proposed to the Foundation as representing the opinion of the scientific community on the needs in certain areas of Antarctic research. The overall program suggestions made by the Academy's Committee serve as guidelines to the Foundation in the formulation of the U.S. Antarctic Research Program.

To assure full cooperation and coordination of intragovernment operations, the Interdepartmental Committee on Antarctic Research, composed of representatives of Government agencies with interests in the Antarctic, has been set up by the Foundation. It examines proposals and programs of the represented agencies and the broad program suggested by the Committee on Polar Research.

In its review process of proposals for Antarctic research, the Foundation includes, in its list of reviewers, members of the panels of the Committee on Polar Research of the National Academy of Sciences, specialists in the field at universities and elsewhere, NSF program directors knowledgeable in the particular field of research, the Chief Scientist of the U.S. Antarctic Research Program, the logistics staff of the Antarctic Program, and lastly the scientific staff of the Antarctic Program for parallel study of scientific merit, budget, and final evaluation of the other reviews.

**Participation by U.S. Scientific Personnel**

Following selection of scientific proposals to receive Foundation support, arrangements are made to send scientists designated by grantee institutions and agencies to carry out investigations in Antarctica. Each new group of personnel selected annually must reach the Antarctic at the beginning of the austral summer, which in the Southern Hemisphere corresponds to the winter months in the Northern Hemisphere. The length of time each member of the group remains in Antarctica depends on the nature of the investigations for which he is responsible. For example, field work in geology and biology and traverse studies must be conducted away from established stations, and, therefore, requires extra logistic support to enable the scientists to live and work in the field, possibly only during the Antarctic summer. Members of each group engaged in such investigations usually remain in Antarctica only for the austral summer, after which they are returned to the United States. They are referred to as the "summer contingent" of a given team. Other members of a group, known as the "winter contingent," are engaged in studies which can be continued at established stations on a year-round basis. Examples of the latter are meteorology, auroral studies, cosmic ray investigations, geomagnetism, and station seismology.

The first group of U.S. scientists to carry out research in the Antarctic following the IGY left the United States in the fall of 1958 and returned November–December 1959. This group is referred to as the U.S. Antarctic Research Program Team I.

The second group of scientists (Team II) left the United States in the fall of 1959. The summer contingent of this group returned February–March 1960, and the winter contingent will return November–December 1960. Team III departed October–November 1960, with the summer contingent returning in February–March 1961 and the wintering complement expected to return in November–December 1961.

Even though additional disciplines beyond those included in the IGY have augmented the program, the change in the number of wintering-over personnel has not been significant because investigation has been primarily concerned with meteorology, glaciology, and upper atmosphere physics—work suitable for year-round operations. The most noteworthy
in the field at universities and elsewhere, NSF program directors knowledgeable in the particular field of research, the Chief Scientist of the U.S. Antarctic Research Program, the logistics staff of the Antarctic Program, and lastly the scientific staff of the Antarctic Program for parallel study of scientific merit, budget, and final evaluation of the other reviews.

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change in the program has been the additional personnel working in the fields of biology, geology, cartography, and related programs, most suitable to summer efforts. Thus, the major enlargement has been in the area of summer personnel. The breakdown of U.S. scientific personnel in Antarctica is shown in the following table.

<table>
<thead>
<tr>
<th></th>
<th>1959 wintering-over team</th>
<th>1959–60 summer team</th>
<th>1960 wintering-over team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Biology</td>
<td>3</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Cartography</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Geology</td>
<td>0</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Glaciology</td>
<td>3</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Meteorology</td>
<td>13</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Oceanography</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Psychology</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Traverse Seismology and Gravity</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Traverse Engineering</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Upper Atmospheric Physics</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32</td>
<td>51</td>
<td>35</td>
</tr>
</tbody>
</table>

A steady increase in the number and dollar amount of proposals received by the Foundation indicates a mounting interest in Antarctic research, particularly on the part of universities and other private institutions. Private institutions received 42 percent of funds available to Team I and 48 percent to Team II; it is anticipated they will receive approximately 55 percent of the funds available to Team III.

**Exchange Scientists**

Throughout the IGY, scientists from several countries cooperating in Antarctic research were exchanged between national expeditions, thus developing closer cooperation and mutual understanding.

The practice of exchanging scientists has been continued following the IGY. During fiscal year 1960 exchanges were arranged between the United States and the USSR and between the United States and France. A Soviet glaciologist is at the U.S. McMurdo Station; the U.S. counterpart—a seismologist-geophysicist—is at the Soviet Mirny Station. A French glaciologist accompanied the U.S. traverse party to northern Victoria Land, and in return the French Antarctic Expedition has suggested that arrangements can be made for an American scientist to winter over at either the Kerguelen Island Station or the Dumont d'Urville Station on the Continent.
The United States is also participating with Australia and France in the International Australian Analysis Center. It replaces the IGY Weather Central originally located at the Little America Station. A U.S. meteorologist is currently spending his second year in Australia assisting in the daily collection, analysis, and forecasting of Antarctic weather data.

In preparation for the forthcoming season, proposals are being considered for continuation of the Soviet-U.S., French-U.S. exchanges of scientific personnel. Discussions have been initiated with the United Kingdom, Belgium, Norway, and Chile for other possible scientist exchange programs.

**Current Research Support**

The Antarctic Research program covers many disciplines. Investigations underway encompass the following:

Observations and measurements of the aurora and airglow in the Antarctic include a study of geographical distribution, auroral spectral features, a determination of auroral height and form, and a survey of radio absorption. Geomagnetic observations are made at each of the stations, with additional field programs for the determination of absolute magnetic values. Experiments in ionospheric physics are carried out in many stations to probe the ionosphere for the determination of change in height, density, and diurnal effect; to measure radio noise; and to study low-frequency atmospheric phenomena, including field observations to establish latitude control of these effects. Surface and upper-air meteorological data are collected at all stations and on traverses, including special observations into the carbon dioxide and ozone content of the upper atmosphere.

Seismological investigations make use of permanent seismographs to record and measure earthquake waves and their travel paths, and of artificial vibrations to study ice thickness and sub-ice geology. Oceanographic research is carried out at stations along the Antarctic coasts and from the U.S. Navy ships sailing in Antarctic waters. Studies in biological and medical sciences include bacteriology, marine fishes, bird migration, psychology, and the study of insect distribution on the Antarctic Continent and in the surrounding area. Glaciological research is conducted to study the regimen and deformation of ice shelves, snow accumulations and wastage, thickness of the ice cap, and the chronological banding of the ice at depth.

Fiscal year 1960 marked the beginning of a new era in Antarctic mapping for the United States. Coordination of aerial photography, ground control, and office compilation resulted in the initiation of production of maps of important areas of West Antarctica.
An expanding program of research in the same disciplines as the above, with increased studies in geodesy and cartography, cosmic radiation, gravity, and geology, will be conducted by the team of scientists arriving in the Antarctic in the fall of 1960. An increased number of seasonal field programs are being planned to occupy sites in Western Antarctica to study the mountain ranges and nunataks, to explore the geological relationship between Western Antarctica, the Antarctica Peninsula, and South America. Geodesy and cartography programs will support these activities by providing detailed maps of areas in which scientists must carry out their programs, as well as providing cartographic material for developing maps of large areas of Antarctica for use by such groups as the U.S. Navy in carrying out its responsibilities to support the scientific program.

Significant Research Developments

Total Synthesis of Chlorophyll.—The total synthesis of chlorophyll, a highly complex natural product, has been accomplished, a feat which defied the efforts of the world’s greatest chemists for years. Starting from simple molecules of known structure not derived from the natural product, a Foundation-supported investigator completely synthesized the chlorophyll molecule and proved it to be identical to the natural product.

Chlorophyll, the green plant pigment, is ultimately responsible for production of the food needed by all living creatures and for the fossil fuels—coal and oil. It converts the energy of the sun into the chemical energy necessary to change carbon dioxide and water into sugar and starch through the process known as photosynthesis. It consists of two components—blue-green chlorophyll a, and yellow-green chlorophyll b, in a ratio of three to one. They differ very slightly in structure. Chlorophyll a is the one which has been synthesized.

The structure of chlorophyll as developed over the past 40 years has been proven accurate by this synthesis. It consists of 4 pyrrole rings joined to a magnesium atom in the center of the molecule. The pyrroles are also found in hemoglobin, the red blood pigment. Improved understanding by biologists of the role of chlorophyll in photosynthesis is sure to result. The new and ingenious methods of synthesis developed will most certainly be useful in the synthesis of other complex materials.

Factors Regulating Feeding Behavior in Man.—A new concept of how appetite is controlled stems from Foundation-sponsored studies on
integrations within the nervous system as they affect feeding behavior and satiety in man and various vertebrates. A multi-factor concept of regulation of feeding is based on the conclusions that appetite is satisfied by: (1) gastric distention resulting from the processes of eating, (2) by relief of low blood sugar or inadequate supply of glucose, (3) by shifting of body water, due to secretions into the gastro-intestinal tract with subsequent tissue dehydration, and (4) the thermal stress of elevation of the metabolic rate resulting from the intake of food itself. This concept acknowledges the ability of the central nervous system to take many different kinds of changes within the body and integrate them into a pattern of response. Whether all of these factors act upon the hypothalamus or lower brain centers is not known, but all of them must act eventually upon feeding reflexes, which means that they must either directly or through other neural pathways affect the motor nerve nuclei of the brain stem.

One can understand how the three generalized changes—sugar lack, water movement, and temperature gradients—might act upon the same neuron or upon all neurons. Whatever their critical actions, the end result of a deficiency of food must be sensitization of reflexes necessary for feeding, as a lack of water in a similar fashion must facilitate drinking reflexes. The key reactions within the brain must be selective enough to provide a basis for specific hungers or appetites. This implies a type of discrimination within the brain stem and lower centers, and it calls to mind Sherrington’s conclusion that there is a spinal-hunger state. He noted “as a broad rule, spinal reflexes are more easily elicited when a well-nourished animal is hungry and expecting food, and less easily when it has just heavily fed. There is, so to say, a spinal hunger.”

THE FIRST SYNTHETIC ANTIGEN.—The culmination of several years work on the preparation of high molecular weight polypeptides has been the discovery of the first synthetic antigen. (Antigens are substances which stimulate the production of antibodies.) This substance, a co-polymer of 3 amino acids—lysine, tyrosine, and glutamic acid in the proportion of 1:2:3—stimulates antibody production in test organisms. The antigenic polypeptide has been shown to be devoid of helical structure and hence it appears that only a short sequence of amino acids including L-tyrosine is necessary for antibody formation. This work represents another step toward an understanding of immune reactions in living organisms and of the nature of biological specificity. In the search for a means of producing effective, safe, and widespread immunization, agents of this type will play an extremely important role.
ALTERING THE STRUCTURE OF BIOLOGICAL MACROMOLECULES.—A new and simple method has been developed by a Foundation grantee for introducing sulfur in the form of thiol (–SH) groups into biological macromolecules—polysaccharides and nucleic acids, as well as proteins. This is accomplished through the use of a sulfur-containing succinic anhydride compound which displaces amino (–NH₂) groups in proteins and hydroxyl (–OH) groups in polysaccharides and nucleotides.

Thiol groups when introduced into the macromolecules may be located at active sites and, therefore, provide an excellent tool for probing molecular structure and for altering physical, chemical, and physiological characteristics of a broad spectrum of biological substances.

* * *

TRANSMISSION OF NERVE IMPULSE.—More complete understanding of the nature of nerve activity has been made possible by the isolation and identification of the acetylcholine receptor protein from the electric tissue of the electric eel. Acetylcholine is a chemical which plays a crucial role in transmitting nerve impulses.

When the nerve membrane is excited, acetylcholine is freed from its storage form and combines with the receptor protein. This combination triggers a change in the ionic permeability of the membrane, allowing sodium ions to enter and potassium ions to leak out, thus generating an electric current. This current propagates the neuron’s message to another neuron or to an effector cell (e.g. muscle). Within milliseconds, the receptor-acetylcholine complex separates as a result of enzyme action and once again the nerve cell returns to its resting stage, ready for the next stimulus.

Identification of the receptor protein was made possible by comparing, in vitro, the binding strength of the receptor protein with acetylcholine-type compounds with the effect of these compounds on electrical activity in isolated electrical eel tissue. A striking correlation was observed between binding strength in the receptor protein solution and effect on electrical activity. (See photographs on page 21.)

* * *

GRAVITY RESPONSE DEPENDENT ON HEREDITARY FACTORS.—Although behavior is greatly influenced by the environment, there is a growing body of evidence that genetic factors play an important part in determining certain kinds of behavioral variation.

Fruit flies (Drosophila) have been shown to vary in their tendency to fly upward or downward when faced with a choice between the two alternatives. In an experiment, conducted with the aid of a National Science Foundation grant, fruit flies are introduced into a maze in which they encounter successive choice points where they may fly either upward
or downward. (See page 30.) The height of the terminal point reached by a fly depends on its response to gravity at the various choice points. If it always selects the upward choice, it finishes at top, the downward choice at bottom; if it sometimes goes upward and sometimes downward, it finishes at an intermediate position.

When a fly population is introduced into the maze, the individuals sort themselves out so as to give rise to a frequency distribution depending on their aggregate responses to gravity at the choice points. Introducing genetically different populations into the maze results in changes in the frequency distribution. This indicates that the variability in gravity response is dependent, at least in part, on the genetic variability in the population.

* * *

FINE STRUCTURE OF GENES DETERMINED.—Major questions of modern biology are the molecular structure of genes and how this structure allows the coding of genetic information. The discovery by an NSF grantee that subunits of a gene are arranged linearly within a gene is a major contribution to the solution of these questions.

The genetic material, at least in lower organisms, is deoxyribonucleic acid (DNA) which consists of a coiled double chain of simpler components called nucleotides. However, individual hereditary units (genes) have not been isolated, so it is not possible to determine by chemical techniques that a particular gene consists of a linear array of nucleotide pairs. But, it is possible to determine the most probable arrangement of separable genetic units utilizing the technique of genetic recombination. This technique is well known to geneticists who have used it to show that genes are arranged linearly within chromosomes. Determination of the fine structure of a gene, however, requires special materials and a selective device to detect rare recombinations between units that may be separated only by the spacing between nucleotides in the DNA molecule. Utilizing microorganisms, it is possible to obtain very large populations of offspring and by using selective techniques to detect events that occur once in 10,000 times or less.

A small section, the size of about 1,000 nucleotides of a DNA molecule, of the genetic material of a bacterial virus has been analyzed by recombination techniques. A large number of mutations of a gene which controls the ability of the virus to grow on certain bacteria has been obtained. If each mutation affects only a portion of a gene, then it is possible, by allowing two viruses with different mutant genes to reproduce within a single bacterium, to obtain progeny viruses that have the unmutated portion of the gene from each of the parent viruses. The “recombined” virus is able to grow on bacterial cells on which
neither of its parents could grow. If a large series of mutations are tested for recombination, then the array of results expected will depend on how the elements are connected with each other, that is, whether the arrangement is linear, branching, circular, or other. A total of 145 mutant genes were tested for recombination of the altered sections within the gene and it was shown that the mutated elements within the gene fit a linear pattern. Though all other possibilities were not eliminated, it is highly probable that the fine structure of a gene is a linear array of nucleotide pairs and perhaps the unit of recombination is a nucleotide pair.

** * * *

**PROGRESS IN DETERMINING MECHANISM OF ACTION OF VITAMIN B_{12}**.—The first specific lead as to the chemical role of Vitamin B_{12} and to the discovery of the coenzyme to which the vitamin is changed in the body has recently been reported. Vitamins are essential substances which the body cannot itself manufacture.

Vitamin B_{12}, essential to animal life, was first isolated from liver in 1958. Its administration is the effective therapy for pernicious anemia.

The coenzyme, a complex organic cofactor, together with its protein entity make up an enzyme which is involved in the rearrangement of the carbon skeleton of essential amino acids (the building blocks of which proteins are composed). It acts as a carbon carrier transferring the carbon from one amino acid (glutamic) to a second (\(\beta\)-methyl aspartate). The coenzyme has the basic structure of Vitamin B_{12} to which two adenine-containing compounds are attached. Exposure to light destroys the activity of the coenzyme by splitting of the adenine complex.

** * * *

**LABORATORY STUDY OF BARGAINING BEHAVIOR IN BILATERAL MONOPOLY SITUATION.**.—The feasibility of the study of classical problems of economics under controlled laboratory conditions has been demonstrated by a Foundation-supported study of bargaining behavior in a situation known to economists as “bilateral monopoly.” It represented the first active collaboration between an economist and an experimental psychologist.

In the bilateral monopoly situation the bargainers consist of a single “buyer” and a single “seller.” Some actual situations that approach bilateral monopoly are: a franchised dealer negotiating with a manufacturer regarding quotas and wholesale price; two public utilities bargaining about the division of some price they have set on a joint service; and labor leaders in a unionized industry dealing with management representatives. This bargaining situation has been of long standing interest.
to economists and there are a dozen “classical” theoretical solutions which attempt to describe the way in which the price, profit, or other payoff will be divided. These solutions are not in mutual agreement. The chief contribution of the new research is the development of an experimental situation of bilateral monopolistic bargaining in which several of the proposed theoretical solutions could be tested.

The results of the experimentation demonstrated that the actual outcome of bargaining in this situation cannot be predicted from economic considerations alone, but is subject to a variety of psychological and cultural forces as well. The experiments show that there is a clear tendency for bargainers to negotiate contracts at that quantity which maximizes joint payoff. Furthermore, they show that the greater the amount of information the bargainers have about their own and the other person’s situation, the more likely they are to settle for maximizing joint payoff. Parallel tendencies are found with regard to the negotiated price at which the transaction is made, with a tendency to approach a fifty-fifty split of the maximum joint payoff under conditions of complete information.

A most important psychological factor in determining differential payoff, especially under incomplete information, is the level of aspiration (the amount of payoff the bargainer wanted or hoped to receive). In almost all cases studied, the bargainer who began with the higher level of aspiration did in fact receive the larger share of the joint payoff.

* * *

PREHISTORIC INHABITANTS OF ARIZONA.—An archaeological study of eastern Arizona has been supported by the Foundation in an attempt to gather information about the pre-history of this little-known area. Evidence has been discovered, near St. Johns, of a primitive people without pottery and probably without agriculture, living in the midst of other tribes with far more advanced cultures. Excavations have indicated that the tribe lived by hunting and gathering wild plants. Tools appear to have been limited to simple implements such as grinding stones and stone-tipped spears. Except for the addition of permanent homes they lived as did their more nomadic ancestors two thousand years before.

Just 70 miles away, other cultures grew corn, fired pottery, and built sturdier, larger, and more complex pit houses. The remote tribe, which existed for more than 2,000 years and inhabited the site as late as 300 A.D., defended itself against its more advanced neighbors and apparently refused to accept the cultural advances of its enemies.

For another discovery of this expedition, see page 27.

* * *
POSITRONIUM.—Positronium is the name given to a short-lived atom comprising a positron and an electron. The atom is similar to the normal hydrogen atom except that the proton, which forms the nucleus of the hydrogen atom, is replaced by a positron, a particle similar to the electron but with a positive electrical charge. Positronium is held together by the attractive force between the positively charged positron and the negatively charged electron in a manner entirely analogous to the attraction between proton and electron which holds together the hydrogen atom. The principal differences between hydrogen and positronium arise from the much lighter weight of the positron as compared to the proton. The positron has the same weight as an electron, so an atom of positronium has a weight equal to twice the electron weight while hydrogen weighs about 1,840 times as much as an electron. As a consequence of this weight discrepancy the radius of the positronium atom is twice the radius of hydrogen.

Positronium is an uncommon chemical element because of its very short lifetime, generally of the order of one ten-millionth of a second. The short lifetime is due to the annihilation of positrons and electrons when they come into proximity to one another—one of the classic illustrations of conversion of matter into radiation. The two particles are annihilated and generally two photons (electromagnetic radiation) are created which carry off the energy associated with the masses of the material particles.

A study of the chemical behavior of positrons and positronium in aqueous solutions has been carried out under a Foundation grant. It reveals that the concept of an oxidation potential is applicable to this problem and that the position of positronium in the electrochemical scale is between that of zinc and cadmium. This is of interest not only because positronium can be considered as a new chemical element, but also because it was never before obvious that ordinary chemical concepts can be applied to the extreme dilution of single atoms present in solutions. This work should also contribute a better understanding to problems related to the structure of water and liquids. The idea that the atom of positronium may be present in some form of cavity in water may possibly be related to some tentative explanations of the viscosity and compressibility of liquids in terms of such hypothetical cavities.

* * *

CHILEAN EARTHQUAKE TSUNAMI RECORDED.—Wave recorders at a depth of 330 feet have been operated off La Jolla, Calif., and at San Clemente Island under a Foundation grant made in May 1959 to continue installations originally made during the IGY.

The San Clemente gage consisted of three recorders located in a
triangle, which made it possible to analyze the records to determine the direction from which the waves travelled. The waves are generated by storms, and since the longest waves travel the fastest, it was possible to locate a given storm from its bearing and the regular decrease in length of the waves produced by it. Storms thus tracked in the Southern Hemisphere agreed with the weather maps as they now exist.

The gage at La Jolla recorded the large tsunami waves received from the Chilean earthquake on May 23, 1960. This is the most detailed tsunami wave recording yet made, as activity was recorded continuously for 7 days. Analysis will yield much new information about the selective attenuation of the energy of a tsunami.

* * *

**Increasing Carbon Dioxide in Atmosphere.**—A sensitive infrared analyzer has been applied to the problem of measuring atmospheric carbon dioxide. This work began during the IGY and has been continued under NSF sponsorship. Since the method is much more precise than previous chemical methods, the results for the first time have clearly demonstrated annual cycles of carbon dioxide in the atmosphere. The air at the South Pole shows no seasonal variation, whereas on Mauna Loa there is a change from about 310 parts per million in October to 316 in May. Superimposed on these annual cycles is a steady increase, of the order of one part per million per year. Such an increase has been expected on theoretical grounds, from the burning of coal and petroleum, but this is the first convincing analytical proof of it.

* * *

**Glacial Epochs More Closely Established.**—Various isotope techniques are yielding important results in the study of undisturbed cores of sediment from the ocean bottom. The ratio of oxygen-16 to oxygen-18 in the calcareous shells of various marine animals gives the temperature of the water at past epochs and hence is a good indicator of climate. The carbon-12/carbon-14 ratio and the protactinium-231/thorium-230 ratio give an absolute dating of these climate epochs. In this way, the investigator has found the date of the peak of the last interglacial period to be 96,000 years ago, with the previous glaciation having ended 10,000 years earlier.

* * *

**Image Tube Development Providing Significant Help to Astronomers.**—A new research tool that is giving astronomers previously unobtainable data may prove to be as great an advance over conventional astronomical photography as photography was over visual observations. The device is called a photoelectric image intensifier, or image tube.
The development of image tubes, as well as investigations using these tubes, have been sponsored by the National Science Foundation.

In essence an image tube is an electronic device for amplifying the signal produced by a photon, or light unit—that is, faint light is in effect made brighter. This enables astronomers to observe heavenly objects heretofore too faint to be identified, or to use much shorter exposure times to lessen atmospheric distortion of brighter objects.

These tubes have already increased telescope speeds by as much as 30 times, and have the potential of increasing them by a factor of 100.

Identification of a very dense star cluster at the center of the Andromeda galaxy is an important result of use of one of the tubes. Little was previously known about this very small and bright light source except that it usually had the appearance of a star. Using the image tube mounted on the coudé spectograph of Lick’s 120-inch telescope, astronomers made two spectroscopic exposures in about 15 and 45 minutes which ordinarily require 5–15 hours.

To state it differently, the 120-inch telescope with the image tube obtained results that would have required a 660-inch telescope without the tube.

An analysis of the spectroscopic results plus photometric data obtained independently shows that the bright object is apparently a large, dense cluster of stars similar to the well-known globular clusters but very much more massive. It is about 24 light years in radius, whirling at high speed, and contains a mass of stars equal to 10 million times the sun’s mass.

If our sun were in the center of the cluster we would see about 10 thousand times as many stars in the night sky as we do now, and the total light from them would be greater than the light of the full moon.

A second investigation using an image tube recorded the infrared lines of the sun’s corona in about one minute. The first photography of these lines, by Lyot at the Pic du Midi Observatory about two decades ago, required 4 hours. The fastest film now available requires an exposure in excess of half an hour. The need for the sky to be extremely transparent for an extended period had made earlier attempts most difficult.

Thirdly, an image tube recorded an observation of binary stars, a use for which the tubes are extremely valuable. Binary or twin stars revolve around each other. To the naked eye and frequently to telescope observations, they appear as one star. An investigation recorded binaries with separations as small as .3 second of arc using the image intensifier, while separations of 1.5 seconds of arc are almost impossible to photograph without it.

With the image tube it was possible to make exposures at 1/100
second, and record the binary images before atmospheric turbulence distorted them.

* * *

Research-Related Activities

Scientific Conferences and Symposia

The Foundation during 1960 sponsored and provided partial support for 44 conferences and symposia. In most cases, sponsorship was shared with one or more private or public agencies, including universities and scientific societies.

CONFERENCE ON OPTICAL PUMPING—Ann Arbor, Mich., July 8–15, 1959; Chairman: Peter Franken, Department of Physics, University of Michigan, Ann Arbor, Mich.; Cosponsor: University of Michigan.


CONFERENCE ON HIGH TEMPERATURE PROBLEMS IN AERONAUTICS—Stanford, Calif., Aug. 5–8, 1959; Chairman: Nicholas J. Hoff, Head, Department of Aeronautical Engineering, Stanford University, Stanford, Calif.; Cosponsors: Air Force Office of Scientific Research, Office of Naval Research, Office of Ordnance Research, Institute of the Aeronautical Sciences, American Society of Mechanical Engineers.

SEMINAR IN MATHEMATICS—University of New Brunswick, Fredericton, New Brunswick, Canada, Aug. 17–Sept. 11, 1959; Chairman: W. L. G. Williams, McGill University, Montreal, Canada; Cosponsor: Canadian Mathematical Congress.

GORDON CONFERENCE ON PHOTONUCLEAR REACTIONS—Kimball Union Academy, Meriden, N.H., Aug. 24–29, 1959; Chairmen: Peter Axel, Physics Research Laboratory, University of Illinois and A. O. Hanson, Department of Physics, University of Illinois, Urbana, Ill.; Cosponsor: Gordon Research Conferences.


SYMPOSIUM ON THE DIFFERENCES AMONG GLOBULAR CLUSTERS—Toronto, Ontario, Canada, Aug. 31, 1959; Chairman: John F. Heard, David Dunlap Observatory, University of Toronto, Richmond Hill, Ontario, Canada; Cosponsors: American Astronomical Society, University of Toronto.

1959 INTERNATIONAL PLASMA PHYSICS INSTITUTE—Seattle, Wash., Aug. 31–Sept. 5, 1959; Chairman: Ronald Geballe, Department of Physics, University of Washington, Seattle, Wash.; Cosponsors: Boeing Scientific Research Laboratory, University of Washington.

CONFERENCE ON DIFFERENTIAL EQUATIONS—Mexico City, Mexico, Sept. 1959; Chairman: Solomon Lefschetz, Director, Center for Differential Equations, Research Institute for Advanced Study (RIAS), Inc.; Cosponsors: Research Institute for Advanced Study (RIAS), Inc., National University of Mexico, Office of Naval Research.
IMMUNOCHEMICAL APPROACHES TO PROBLEMS IN MICROBIOLOGY—New Brunswick, N.J., Sept. 1–3, 1959; Chairman: Michael Heidelberger and Otto J. Plescia, Institute of Microbiology, Rutgers, the State University, New Brunswick, N.J.; Cosponsor: Rutgers, the State University.


THIRD ASTROMETRIC CONFERENCE—La Plata Observatory and the Cordoba Observatory, Argentina, Oct. 30–Nov. 3, 1959; Chairman: Dr. R. P. Cesco (La Plata), and Dr. L. Gratton (Cordoba); Cosponsors: National Academy of Sciences, Special Committee of the International Astronomical Union on Astrometry in the Southern Hemisphere, and the Organization of American States.


CONFERENCE ON ASTRONOMICAL OBSERVATIONS FROM ABOVE THE EARTH'S ATMOSPHERE—Cleveland, Ohio, Dec. 30, 1959; Chairman: Fred Hoyle, Cambridge University, England; Cosponsor: Case Institute of Technology, American Astronomical Society.


PHYSIOLOGY OF PARASITISM—New Brunswick, N.J., Jan. 29–30, 1960; Chairman: Leslie A. Stauber, Department of Zoology, Rutgers, the State University, New Brunswick, N.J.; Cosponsor: Rutgers, the State University.


CONFERENCE ON THE POLARIZATION OF STARLIGHT—Kitt Peak and Steward Observatories, Tucson, Ariz., Feb. 6, 1960; Chairman: W. A. Hiltner, Yerkes Observatory, University of Chicago and Jesse R. Greenstein, California Institute of Technology; Cosponsor: Lowell Observatory.

FOURTEENTH ANNUAL SYMPOSIUM ON FUNDAMENTAL CANCER RESEARCH—Houston, Tex., Feb. 25-27, 1960; Chairman: T. C. Hsu, M. D. Anderson Hospital and Tumor Institute, Houston, Tex.; Cosponsors: The University of Texas, M. D. Anderson Hospital and Tumor Institute, University of Texas Postgraduate School of Medicine, Texas Division of the American Cancer Society, Texas State Department of Health.


SYMPOSIUM ON LIFE AND LIGHT—McCallum-Pratt Institute, Baltimore, Md., March 28-31, 1960; Chairman: William D. McElroy, Mergenthaler Laboratory for Biology, Johns Hopkins University, Baltimore, Md.; Cosponsor: Johns Hopkins University.

MIDWEST CONFERENCE ON THEORETICAL PHYSICS—Lafayette, Ind., April 1-2, 1960; Chairman: Solomon Gartenhaus, Department of Physics, Purdue University, Lafayette, Ind.; Cosponsor: Purdue University.

HISTOCHEMISTRY OF THE NERVOUS SYSTEM—New York, N.Y., April 10, 1960; Chairman: Oliver H. Lowry, President, Histochemical Society, School of Medicine, Washington University, St. Louis, Mo.; Cosponsor: Histochemical Society.


INTERNATIONAL CROSS-FIELD SEMINAR ON SOLAR-WEATHER RELATIONSHIPS—Lake Arrowhead, Calif., April 15-22, 1960; Chairman: Walter Orr Roberts, Director, High Altitude Observatory, University of Colorado, Boulder, Colo.; Cosponsors: Committee on Cosmic-Terrestrial Relationships of the American Geophysical Union, High Altitude Observatory of the University of Colorado, University of California at Los Angeles.


PHYSIOLOGICAL AND BEHAVIORAL ASPECTS OF TASTE—Ithaca, N. Y., June 1960; Chairman: Morley R. Kare, Department of Veterinary Physiology, New York State Veterinary College, Cornell University, Ithaca, N.Y.; Cosponsor: Cornell University.


FIRST INTERNATIONAL POWDER METALLURGY CONFERENCE—Biltmore Hotel, New York, N.Y., June 13–17, 1960; Chairmen: Kempton H. Roll, Executive Secretary, Metal Powder Industries Federation, and Fritz V. Lenel, Department of Metallurgical Engineering, Rensselaer Polytechnic Institute, Troy, N.Y.; Cosponsors: Metal Powder Industries Federation, Powder Metallurgy Committee, Institute of Metals Division of the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers.


FOURTH BERKELEY SYMPOSIUM ON STATISTICS AND PROBABILITY—University of California, Berkeley, Calif., June 20–July 30, 1960; Chairman: Jerzy Neyman, Director of the Statistical Laboratory, University of California, Berkeley, Calif.; Cosponsors: Office of Naval Research, Office of Ordnance Research, Air Force Office of Scientific Research, National Institutes of Health.
Three patents have been issued on inventions arising out of Foundation-supported research during the 1960 fiscal year, the first to result from Foundation-supported scientific activities. Patent No. 2,932,797 and Patent No. 2,932,798 both relate to “imparting energy to charged particles” and were developed during the course of research supported through a grant to Midwestern Universities Research Association. These patents have been obtained and are being administered, pursuant to agreement with MURA, by the Research Corporation, a nonprofit organization which distributes its total net income in support of scientific research through grants to academic and scientific institutions. The Foundation has secured for the Federal Government irrevocable, royalty-free, nonexclusive, nontransferable licenses to practice these inventions and cause them to be practiced for governmental purposes.

Patent No. 2,918,699, entitled “Press” was developed under a grant to Brigham Young University. Applications for patents on this invention have also been filed in the United Kingdom (No. 14,370/59) and in Canada (No. 771,918). The Foundation has also secured for the Government irrevocable, royalty-free, nonexclusive and nontransferable licenses to practice this invention and cause it to be practiced for governmental purposes. The Research Corporation is administering this invention pursuant to an agreement with Brigham Young University.

Fiscal Analysis of Research Programs

In fiscal year 1960, a total of 1995 grants were made in support of basic research to 362 institutions throughout the United States and its possessions; also to Japan, Lebanon, Netherlands, Southern Rhodesia, France, West Germany, Israel, Italy, England, Chile, Canada, Bermuda, Australia, and Argentina. Research expenditures totaled $78 million—$62 million for research grants and $16 million for facilities.

The average 1960 research grant was for the sum of $30,008 for a period of 2.2 years. This compares with the average grant in 1954 (earliest for which records are readily available) of $10,465 for 1.9 years.
Table 1.—Distribution of research grant funds by type of expenditure
fiscal year 1960

<table>
<thead>
<tr>
<th>Object</th>
<th>Average grant fiscal year 1960</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
</tr>
<tr>
<td>Salaries</td>
<td>$16,615</td>
</tr>
<tr>
<td>Permanent Equipment</td>
<td>3,813</td>
</tr>
<tr>
<td>Expendable Equipment</td>
<td>2,236</td>
</tr>
<tr>
<td>Travel</td>
<td>1,029</td>
</tr>
<tr>
<td>Other</td>
<td>2,411</td>
</tr>
<tr>
<td>Total direct</td>
<td>26,104</td>
</tr>
<tr>
<td>Indirect</td>
<td>3,904</td>
</tr>
<tr>
<td>Total</td>
<td>30,008</td>
</tr>
</tbody>
</table>

1 Based on budget estimates at time of activation.
2 Based on 1,943 grants awarded totaling $58,303,861 for an average duration of 2.20 years.

The accompanying table summarizes the research grant program by subject categories. A detailed list of grants showing institution, principal grantee, title of project, duration, and amount is given in appendix C.
Table 2.—National Science Foundation grants, by fields of science, fiscal year 1960

<table>
<thead>
<tr>
<th>Field</th>
<th>Number</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological and medical sciences:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developmental biology</td>
<td>65</td>
<td>$1,706,495</td>
</tr>
<tr>
<td>Environmental biology</td>
<td>129</td>
<td>2,650,000</td>
</tr>
<tr>
<td>Genetic biology</td>
<td>74</td>
<td>2,100,300</td>
</tr>
<tr>
<td>Metabolic biology</td>
<td>116</td>
<td>3,103,100</td>
</tr>
<tr>
<td>Molecular biology</td>
<td>116</td>
<td>5,542,700</td>
</tr>
<tr>
<td>Psychobiology</td>
<td>83</td>
<td>2,192,730</td>
</tr>
<tr>
<td>Regulatory biology</td>
<td>121</td>
<td>3,527,275</td>
</tr>
<tr>
<td>Systematic biology</td>
<td>149</td>
<td>2,767,150</td>
</tr>
<tr>
<td>General biology</td>
<td>38</td>
<td>1,144,660</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>891</td>
<td>24,734,410</td>
</tr>
<tr>
<td>Mathematical, physical, and engineering sciences:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Astronomy</td>
<td>62</td>
<td>2,169,500</td>
</tr>
<tr>
<td>Atmospheric</td>
<td>44</td>
<td>3,912,525</td>
</tr>
<tr>
<td>Chemistry</td>
<td>222</td>
<td>5,462,500</td>
</tr>
<tr>
<td>Earth sciences</td>
<td>127</td>
<td>4,128,735</td>
</tr>
<tr>
<td>Engineering sciences</td>
<td>184</td>
<td>5,702,405</td>
</tr>
<tr>
<td>Mathematical sciences</td>
<td>132</td>
<td>3,648,600</td>
</tr>
<tr>
<td>Physics</td>
<td>145</td>
<td>6,444,100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>916</td>
<td>31,468,365</td>
</tr>
<tr>
<td>Social sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthropology</td>
<td>49</td>
<td>717,850</td>
</tr>
<tr>
<td>Economics</td>
<td>16</td>
<td>526,986</td>
</tr>
<tr>
<td>History and philosophy of science</td>
<td>12</td>
<td>85,750</td>
</tr>
<tr>
<td>Sociology</td>
<td>32</td>
<td>758,600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>109</td>
<td>2,089,186</td>
</tr>
<tr>
<td>Antarctic research (life and physical sciences)</td>
<td>79</td>
<td>3,625,851</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>1,995</td>
<td>61,917,812</td>
</tr>
</tbody>
</table>
EDUCATION IN THE SCIENCES

Nine years have elapsed and much money and effort have been expended for the promotion of education in the sciences by the Foundation since the initial grant for fellowships was made in 1952.

An appraisal of this activity conducted by the Foundation, through the Division of Scientific Personnel and Education, shows that a marked degree of success has attended these developing programs. The evidence indicates that the overall beneficial effect of the Foundation's educational activities is without precedent. The degree of acceptance of these activities by the scientific-educational community has been gratifying and, in some respects, startling; yet it is understandable because the Foundation's programs have been predicated on the requirements of that community. The success and acceptance of these education programs have stemmed from the fact that these efforts have made significant contributions toward meeting needs as they have been identified by those best equipped to know.

In the early years, primary emphasis was placed on the science-educational needs of the more advanced scholars—the graduate students and established scientists—through the fellowships programs. Initiated in 1952, with 624 awards at a cost of $1.5 million, these programs have increased their coverage to provide 4,010 fellowships representing a total obligation of $13.5 million in 1960.

The second period saw the continuance and diversification of these efforts and the advent of programs developed around the needs of the science, engineering, and mathematics teachers—programs, first, for college teachers; later, and with greater emphasis, for secondary school teachers. The program of institutes which began with 2 summer institutes in 1953 had grown by 1960 to 649 institutes—412 summer, 33 academic year, and 204 in-service, at a cost of over $33 million. One-half of all funds for education in the sciences has been used in support of secondary school teacher programs.
Figure 1. Distribution of Funds for Education in the Sciences Programs; By Problem Area, 1952–60, Inclusive.

- Training of Secondary School Teachers: $89.0 million
- Students (Graduate and above): $34.0 million
- Students (Undergraduate and below): $15.5 million
- Course Content Improvement: $13.5 million
- College Teachers: $12.2 million
- Others: $11.4 million
High school and college student programs were launched in 1953 with a very modest budget which has grown in 1960 to $11 million.

Support for activities designed to effect an improvement in science courses and curricula has increased since its beginning in 1954 to approximately $6 million in 1960.

The data presented in figure 1 represent the distribution of NSF funds according to broad program areas for education in the sciences. Funds for specific program activities are presented, as appropriate, in the general text.

**Principles Guiding Operation of Education Programs**

It seems appropriate at this time to restate the basic principles that have guided the Foundation in carrying out its responsibilities in science education.

1. A successful attack on the problems of education in the sciences is a matter of critical importance to the Nation’s welfare. This attack must be launched and prosecuted with sustained vigor and perception and should be based on the Nation’s needs both now and in the future, whether in times of peace or war.

2. The educational system of the Nation is varied, complex and decentralized, but its fundamental strength rests on such attributes. Such assistance as the Foundation can bring to bear on the problem of improving education in the sciences must be rendered so as to respect and preserve what have proved to be fundamental strengths. The Foundation’s programs must not result in NSF assuming any measure of control over the processes of education.

3. There is no substitute for excellence. The Foundation strives to encourage initiative and imagination on the part of scientists, scientist-teachers, educational institutions, and scientific organizations in devising promising new ways of improving education in the sciences. The Foundation will recommend support of those activities which, on the basis of the fullest internal and external review, seem most likely to be worthwhile. Each proposal will be judged individually on its intrinsic merit.

4. To be successful, attacks on problems of education require mutual and sympathetic cooperation between eminent teachers and eminent scientists. The Foundation will actively solicit and encourage such cooperation. Further, NSF’s programs must be developed with the fullest cooperation and advice of the scientific-educational community. Only in this way can they attain the degree of relevance that is a prerequisite to success.

5. There is no one solution to the problems of education in the sciences. Concerted action by many individuals and groups working on
many facets simultaneously is necessary. The Foundation's activities must supplement, not compete with, those of others.

6. It is of paramount importance that education in the sciences be based upon the substantive content and nature of contemporary science itself. The scientific personnel and education activities of the Foundation will be based on this principle.

It will be noted that a basic theme underlies all these principles—cooperation with scientist-educators in the pursuit of excellence. To this end, in fiscal year 1960 the Foundation obtained in formal ways the counsel of more than 1,000 scientists who served on various panels and committees in reviewing proposals in science education and applications for fellowships. The opinions of many others were sought in informal ways. Special advisory panels were appointed to counsel with the staff on institutes, special projects, and course content.

Fellowship Programs

Fellowships have proved to be effective instruments in encouraging and facilitating the scholarly pursuit of knowledge. They provide an impetus toward the conquest of new frontiers of knowledge. They are investments in the future of individuals of high potential, individuals upon whom society is dependent to a marked degree for its future progress.

Awarding fellowships was among the first of the Foundation's activities. From the two original programs in 1952, this activity has grown to include, in 1960, seven different fellowship programs which have provided 13,350 awards through fiscal year 1960. These NSF fellowship programs are as follows:

1. Graduate Fellowships for students studying for a master's or a more advanced degree in science, mathematics, or engineering. (Initiated in 1952.)

2. Cooperative Graduate Fellowships similar to graduate fellowships except that certain aspects of the program are administered jointly by the cooperating institutions and the National Science Foundation. (Initiated in 1959.)

3. Summer Fellowships for Graduate Teaching Assistants for support of summer study by graduate teaching assistants. (Initiated in 1959.)

4. Postdoctoral Fellowships primarily for individuals who have recently received a doctoral degree in science, mathematics, or engineering. (Initiated in 1952.)

5. Senior Postdoctoral Fellowships primarily intended for recognized senior scientists, mathematicians, and engineers. (Initiated in 1956.)
Figure 2. Growth of National Science Foundation Fellowship Programs. Number of Awards Offered, Fiscal Year 1952–60.

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</tr>
</thead>
<tbody>
<tr>
<td>Secondary School Teachers</td>
<td>569</td>
<td>515</td>
<td>657</td>
<td>715</td>
<td>775</td>
<td>845</td>
<td>1,084</td>
<td>1,100</td>
<td>1,200</td>
</tr>
<tr>
<td>Teaching Assistant</td>
<td>624</td>
<td>557</td>
<td>737</td>
<td>785</td>
<td>925</td>
<td>1,109</td>
<td>1,527</td>
<td>3,628</td>
<td>4,010</td>
</tr>
<tr>
<td>Cooperative Graduate</td>
<td>127</td>
<td>216</td>
<td>1,190</td>
<td>480</td>
<td>460</td>
<td>480</td>
<td>1,190</td>
<td>1,190</td>
<td>1,190</td>
</tr>
<tr>
<td>Science Faculty</td>
<td>109</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>Postdoctoral Senior</td>
<td>84</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Postdoctoral Regular</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
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<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Number of Awards Offered, Fiscal Year 1952–60.
6. Science Faculty Fellowships for junior college, college, and university teachers of science, mathematics, and engineering. (Initiated in 1957.)

7. Summer Fellowships for Secondary School Teachers for the support of individual graduate study by secondary school teachers of science and mathematics. (Initiated in 1959.)

A total of 4,010 fellowship awards were offered in 1960, representing a cost of approximately $13.5 million.

In addition to the previously listed programs, the Foundation, at the request of the Department of State, administered for the second year the U.S. component of a program of North Atlantic Treaty Organization (NATO) Postdoctoral Fellowships in Science. Under this program a total of 41 awards were offered to U.S. citizens in fiscal year 1960. For the first time, similar responsibilities were undertaken in 1960 for providing administrative guidance in the United States for a new fellowship program initiated by the Organization for European Economic Cooperation (OEEC)—the OEEC Senior Visiting Fellowships. The objective of this program is to strengthen institutions in significant areas of research and training. A total of 27 awards were offered to U.S. citizens.

Recipients of NSF fellowships are selected in national competition solely on the basis of ability. Initial evaluation is performed by panels of scientists appointed by, and operated under the aegis of, the National Academy of Sciences-National Research Council, the Association of American Colleges, or the American Association for the Advancement of Science. Awards are made by the Foundation on the basis of the panels' recommendations and in compliance with statutory requirements. (See Appendix E for listing of fellowship awards.)

Graduate Fellowships (Predoctoral)

This program fosters nationwide competition, and awards are offered to those candidates for advanced degrees having the highest ability and those judged to have the greatest potential for developing into well-qualified scientists, mathematicians, and engineers. Because the standards for selection are high, these awards enjoy a high prestige value and are very much sought by many of the Nation's ablest students.

In fiscal year 1960 a total of 4,696 applications were received; the Foundation selected 1,200 persons for awards. In addition, 2,272 applicants were accorded Honorable Mention.

Cooperative Graduate Fellowships

The Cooperative Graduate Fellowship Program, like the Graduate Fellowship Program, is intended to support graduate students of the
highest ability in the pursuit of their scientific studies. This program, however, is designed to achieve broader distribution of awards among participating institutions; the institutions themselves play an important part in the preliminary evaluation of applicants and in the administration of the program.

Fiscal year 1960 marked the second year of the program's existence. All institutions which confer doctoral degrees in the science areas covered by these awards were invited to participate, thus increasing the number of participating institutions to 152, as compared with 115 in the first year.

A total of 3,091 individuals applied through 144 colleges and universities. The Foundation selected 1,190 individuals, representing 134 institutions, for awards.

Summer Fellowships for Graduate Teaching Assistants

First offered in 1959, this program was designed to enable graduate teaching assistants at designated participating institutions to devote full time, during the summer, to their own study and research in the sciences, mathematics, and engineering. Individuals apply through their own institutions and are initially evaluated by them. They are then evaluated centrally, with final selections being made by the Foundation solely on the basis of the applicants' ability.

As in the Cooperative Graduate Fellowship Program, all institutions which confer doctoral degrees in the science areas covered by these awards were invited to participate. There were 150 participating institutions in this year's program, compared with 115 institutions in fiscal year 1959.

Of the 1,362 individuals who applied in 1960, through 127 colleges and universities, the Foundation selected 580 awardees representing 118 institutions.

Postdoctoral Fellowships (Regular)

The Postdoctoral Fellowship Program, now in its ninth year of operation, offers support to individuals who have, in most cases, recently received doctoral degrees in science, mathematics, or engineering, and who need and are qualified for additional advanced training as investigators in their chosen fields. Since 1956 there have been two award periods each year—one in October and the other in March. Tenures may range from 6 to 24 months depending on the program planned by the individual.

There were two competitions in fiscal year 1960, with awards announced in October 1959 and in March 1960. Of the 782 applicants, the Foundation selected 180 persons for awards.
Senior Postdoctoral Fellowships

The Senior Postdoctoral Fellowship Program offers well established scientists, mathematicians, and engineers the opportunity to pursue additional study and/or research with a view toward increasing their competence in their specialized fields or toward broadening their knowledge in related fields of science. Tenures of 3 to 24 months are available, although the usual tenure is for 9 or 12 months.

Of the 259 applicants in this year's program, the Foundation selected 75 individuals for awards.

This program has received the enthusiastic support of the scientific community and appears to be meeting an important need. A renewal policy in the Senior Postdoctoral Fellowship Program has been established and becomes effective in the fiscal year 1961 competition, as follows:

Any person who has held a Senior Postdoctoral Fellowship for 2 years is ineligible for a period of 5 years to hold another such fellowship.

Science Faculty Fellowships

The Science Faculty Fellowship Program provides an opportunity for college and university teachers of science, mathematics, and engineering with 3 or more years of science teaching experience at the collegiate level to improve their competence as teachers. Tenures of 3 to 15 months are available. A unique feature of this program is the provision which allows awardees to undertake their fellowship studies in either one, two, or three consecutive summer periods.

A review of this program, carried out in 1959, indicated that it should be divided administratively into two parts—one to be a competition among applicants with a Ph. D. degree, and the other for applicants in a non-Ph. D. category. The 709 applicants this year were thus categorized and the resulting groups of applicants were evaluated by two independent panels. The Foundation selected 285 individuals for awards, dividing the awards proportionately between the two groups as determined by the ability level and the number of applicants in each group.

Summer Fellowships for Secondary School Teachers of Science and Mathematics

This fellowship program enables secondary school teachers of high ability to undertake study programs in the subject matter of science and mathematics during one, two, or three summers. These fellowships, emphasizing study on an individual basis, are intended to supplement the
Foundation's institute programs, the latter being especially designed for training groups of teachers.

A total of 2,221 teachers—representing a 40 percent increase over 1959—applied for these fellowships. Many applicants failed to qualify because they lacked the undergraduate training prerequisite to graduate study in science or mathematics. The Foundation selected 500 individuals to be offered awards.

**Extramural Fellowships**

1. **North Atlantic Treaty Organization (NATO) Postdoctoral Fellowships in Science.**

   Again, as in fiscal year 1959, the Foundation administered the program of NATO Postdoctoral Fellowships in Science. This program is designed to stimulate the exchange of scientists among the NATO countries by the fellowship mechanism, each member nation being charged with selecting fellows from among its own citizens.

   Applications for fiscal year 1960 fellowships were received from 162 U.S. scientists; 41 applicants were offered awards by the Foundation.

   The fellows will study in Canada, Denmark, France, the Federal Republic of Germany, Italy, The Netherlands, Norway, the United Kingdom—all NATO countries—as well as Israel and Sweden.

2. **Organization for European Economic Cooperation (OEEC) Senior Visiting Fellowships.**

   In order to assist scientific and technical institutions to incorporate more quickly into their own advanced teaching and research programs the most recent developments in their own and other countries, the Organization for European Economic Cooperation has established a program of OEEC fellowships. Each member or associated OEEC country administers the OEEC fellowship program for its own nationals. In fiscal year 1960 the Foundation assumed the responsibility for administering this new program for citizens of the United States, including the selection of fellows.

   This program emphasizes the strengthening of the scientific work of the institutions of the fellowship recipients, rather than research training of individual scientists, as such, or individual academic study. Fields supported include the mathematical, physical, biological, and engineering sciences, but not the social sciences or medicine. Awards normally are tenable for periods of 8 weeks to 6 months, and in unusual circumstances for as long as 1 year. Recipients of awards are usually expected to study abroad in one or more countries that belong to or cooperate with the Organization for European Economic Cooperation.
Thirty-five scientists applied for awards; 27 grants were made. The awardees will study in 10 European countries.

Institute Programs

The Foundation's institute programs are directed toward raising the level of the teaching of science, mathematics, and engineering in our Nation's schools. Consisting of three major types—Summer Institutes, Academic Year Institutes, and In-Service Institutes—these programs provide supplemental training in subject matter for high school and college teachers, as well as for staff personnel of technical institutes and elementary schools. As contrasted with the individualized study made available through fellowship programs, the institute programs offer "group" activities and employ course materials especially prepared to meet the subject matter needs of participating teachers.

A secondary objective of institute programs is to provide colleges and universities opportunity to carefully review science and mathematics courses now available to both pre-service and in-service teachers who seek to improve their teaching competence in these areas.

Since the program's inception in 1953, the Foundation has made grants for the support of 1,661 institutes—1,057 Summer Institutes, 102 Academic Year Institutes, and 502 In-Service Institutes. The largest portion of these, 1,418 or 85 percent, was for secondary school teachers. In 8 years of operation, a total of 81,000 opportunities for study have been made available through the NSF institute programs—opportunities for 73,550 high school teachers, 5,550 college teachers, 1,750 elementary school teachers, and 150 technical institute teachers. The institute programs have grown from an operation which involved the expenditure of $21,000 in 1953 to one with an estimated obligation in fiscal year 1960 of more than $33 million.

For fiscal year 1960 the Foundation supported 649 institute programs. Of this number, 412 were Summer Institutes; 33 Academic Year Institutes; and 204 In-Service Institutes. As shown in the table below, over 31,000 teachers received financial assistance which enabled them to pursue further study in the fields of science and mathematics.

**Summer Institutes**

A total of 412 NSF-sponsored summer institutes were held in the 1960 fiscal year with 22,000 teacher-participants (20,310 received NSF assistance). Each of these institutes offers courses directed toward a particular educational level and a specific level of attainment in a particular subject-matter area or, alternatively, in several scientific disciplines. In addition to course work, the institutes commonly provide seminars and
Table 3.—Study Opportunities in NSF Institute Programs

<table>
<thead>
<tr>
<th></th>
<th>Fiscal year 1960</th>
<th>Fiscal years 1953–60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer institutes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>17,415</td>
<td>47,000</td>
</tr>
<tr>
<td>College</td>
<td>2,273</td>
<td>5,500</td>
</tr>
<tr>
<td>Elementary school</td>
<td>542</td>
<td>1,100</td>
</tr>
<tr>
<td>Technical institutes</td>
<td>80</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>20,310</td>
<td>53,750</td>
</tr>
<tr>
<td>Academic year institutes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>1,494</td>
<td>4,850</td>
</tr>
<tr>
<td>College</td>
<td>43</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>1,537</td>
<td>4,900</td>
</tr>
<tr>
<td>In-Service institutes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>8,888</td>
<td>21,700</td>
</tr>
<tr>
<td>Elementary school</td>
<td>405</td>
<td>650</td>
</tr>
<tr>
<td>Total</td>
<td>9,293</td>
<td>22,350</td>
</tr>
<tr>
<td>Total</td>
<td>31,140</td>
<td>81,000</td>
</tr>
</tbody>
</table>

1 The above figures, representing study opportunities, do not reflect the number of individual teachers who were granted support. In some cases, a teacher may have attended more than one institute in a program and/or more than one program over a period of years.

colloquia, as well as lectures by eminent visiting scientists. Ample opportunity is provided for informal discussions between participants, and between participants and staff. Such discussions and other group-learning activities are encouraged in the typical institute through special arrangements which enable participants to live in the same dormitory, eat together, go on field trips, attend special lectures, etc.

**Summer Institutes for High School and College Teachers of Science and Mathematics**

This summer institute program is now in its seventh year of operation. Through these institutes, supplemental training has been made available to teachers of biology, radiation biology, chemistry, earth sciences, engineering, general science, geology, history and philosophy of science, isotope technology, mathematics, and physics. Institutes in radiation biology and isotope technology are sponsored jointly by the Foundation and the Atomic Energy Commission.
Of the 379 summer institutes supported by Foundation grants during the past fiscal year, 38 were for college teachers only; 24 for secondary school and college teachers, and the remaining 317, for secondary school teachers only.

The number of participants for each institute ranged from 15 to 150, the average number being 50 per institute. The average duration of a summer institute was approximately 7 weeks, although some institutes were of only 4 weeks' duration and others were in session for as many as 12 weeks.

**Summer Institutes for Elementary School Supervisors and Teachers**

Developed on an experimental basis in 1959, this program provides institutes designed to give elementary school supervisors and teachers opportunity to increase their knowledge of science and mathematics, so that appropriate components of these subjects can be taught more effectively to elementary school students. In fiscal year 1960 the Foundation continued to support this program by sponsoring 15 institutes, which were attended by approximately 550 participants.

**Summer Institutes for Technical Institute Personnel**

Organized and administered in a manner similar to the institutes for high school or college teachers, the Summer Institutes for Technical Institute Personnel are specifically designed to meet subject-matter needs of teachers of science, mathematics, and engineering in technical institutions not conferring the baccalaureate degree. In 1960, as in 1959, two institutes of this type were supported with approximately 80 participants.

**Summer Conferences for College Teachers**

Each summer conference is designed as a short course or as a lecture series in a specialized subject-matter area of science, mathematics, or engineering. Sixteen were supported in fiscal year 1960.

**Academic Year Institutes**

The Academic Year Institute Program supports efforts of universities and colleges in providing opportunities for experienced secondary school teachers of science and mathematics to spend an entire academic year in full-time study of the subject matter of their disciplines. Planned and conducted by the individual universities and colleges, the institute courses are especially designed to meet the needs of teachers whose formal scientific education is inadequate. These courses are aimed primarily at increasing the competence of teachers by improving their knowledge of subjects they teach.
Grants for two institutes held in 1956–57 marked the beginning of the Academic Year Institute Program. Because these institutes have been so successful in meeting the need for subject-matter training for experienced teachers, the number of institutes had been increased to 33 by the 1960–61 academic year, with places for 1,537 teachers.

In-Service Institutes

In-service institutes make it possible for science and mathematics teachers to continue studies on a part-time basis during the academic year at colleges and universities within commuting distance to their homes. Participating teachers receive no stipends, but are given modest travel and book allowances through sponsoring institutions which receive Foundation support to cover costs of operation. During 1959–60 a total of 182 in-service institutes for secondary school teachers received support and offered instruction for 8,650 participants. For the 1960–61 school year about 8,900 secondary school teachers will participate in 191 in-service institutes.

Approximately half of the course work offered in these institutes will be in the field of mathematics, with the remainder covering the range of the biological, physical, and earth sciences. As an innovation, two in-service institutes will be conducted in radiation biology, with joint support from the National Science Foundation and the Atomic Energy Commission. Noteworthy also are 19 institutes which will present background material for teachers who wish to familiarize themselves with the new physics course developed by the Physical Science Study Committee. (See page 100.)

In-service institutes for elementary school supervisors and teachers are similar to those for secondary school teachers. Courses offered have been especially designed to meet the elementary schools' need for informed instruction and supervision in science and mathematics in line with a primary objective of the program to give colleges and universities opportunity to experiment with course materials adapted to the training of elementary teachers.

The In-service Institutes Program will in the 1960–61 academic year support 13 institutes for elementary school personnel which will provide instruction for 405 teachers, supervisors, and principals.

Special Projects in Science Education

The Special Projects in Science Education activities deal primarily with the development and experimental testing of new ideas for the improvement of science education and of public understanding of science. The first projects of this kind were supported in 1953, consisting of mod-
est programs for secondary school science education and supplemental training of science teachers. From these early efforts, two major NSF operational programs emerged—Institutes and Course Content Improvement.

The major program categories included under the Special Projects in Science Education are: Secondary School Programs; College Programs and Teacher Improvement Programs; and Public Understanding of Science.

Secondary School Programs

Programs directed toward the secondary school level are intended to motivate high school students’ interest in, and understanding of, science, mathematics, and engineering. Special projects focused on this objective are planned by universities, colleges, scientific societies, research organizations, and other groups, and supported by grants from the Foundation.

Visiting Scientists (Secondary Schools)

Grants are made under this program to professional groups to sponsor the visits of outstanding scientists to secondary schools for the purpose of acquainting students and faculties with the sciences as vital activities and providing counsel relative to careers and education in the sciences. In addition, an increasing opportunity for closer liaison between science faculties of colleges and universities and science teachers and students in secondary schools is made possible.

For fiscal year 1960, grants were made to the: American Chemical Society, American Institute of Biological Sciences, American Institute of Physics, Mathematical Association of America, and the University of Puerto Rico.

Traveling Science Libraries

This program is designed to interest the high school student in science and mathematics through the reading of stimulating books in these subject areas. The American Association for the Advancement of Science, assisted by a committee of experts, selects 200 books each year as representative of the books most appropriate for high school students in the various fields of science. Books are chosen for content, intrinsic interest, and a writing style suitable to the reading audience.

During the 1959–60 school year, 375 sets of 200 books each were sent to 1,678 high schools and preparatory schools, as well as to 4 county libraries serving a large number of small schools. During the summer months, many sets were loaned to National Science Foundation-sponsored institutes for science teachers.
In addition, a traveling science library program for elementary schools was initiated during the past school year. A total of 802 elementary schools received sets of 160 books, and there were indications that this library service is particularly helpful to students of unusual ability.

**Traveling Science Demonstration Lectures**

This program provides opportunities for secondary school students and teachers to observe special science lecture-demonstrations in physics, chemistry, biology, and mathematics. Especially trained secondary school science teachers present the demonstration lectures. Currently four centers are established for the training of teachers. A total of 120 teachers began training in the summer of 1960.

The Oak Ridge Institute of Nuclear Studies (ORINS) is presently experimenting with academic-year training sessions of 12 week's duration for locally supported teachers; these sessions parallel the summer training sessions held at all four centers—ORINS, Michigan State University, Oklahoma State University, and the University of Oregon.

During academic year 1959–60, visits were made to about 1,700 high schools by the NSF-supported traveling teachers; about 12,000 teachers and 700,000 students were reached. In addition, 35 locally supported teachers have been trained and have returned to their own school districts for more intensive work over a longer period of time.

**Science Clubs**

Through the Science Clubs program, the Foundation provides support for extracurricular science projects carried on under the guidance of national youth organizations. The objective of this program is to stimulate the interest of pre-college age students in science and in scientific and engineering careers.

In fiscal year 1960, the Foundation continued to provide partial support to Science Service, a nonprofit organization which provides direction and central administrative services to the organization known as Science Clubs of America. Currently there are over 25,000 local affiliated Science Clubs, chiefly at junior and senior high schools, with a total membership of about 600,000. The Foundation also provided support to the Junior Engineering Technical Society for administering the development and distribution of 16 academic units (booklets) to over 650 local affiliated clubs. These booklets present topics pertinent to engineering, technology, or applied science. The Junior Engineering Technical Society provides brochures for career guidance; also ideas and materials for building chapter programs, and for improving the scientific potential of its members.
Summer Training for Secondary School Students

Through this activity, support is provided to colleges, universities, and other non-profit research institutions for programs offering opportunities to high-ability secondary school students to study and work with experienced scientists and mathematicians at the sponsoring institutions.

Two general types of training are presented. Most common are institute-type training courses, varying in duration from two to eleven weeks and featuring classroom work, laboratory exercises, and field trips centered around a specified area of science. In some cases, however, the training is based upon student participation in actual research projects of appropriate scope under the guidance of scientists.

About 7,100 students participated in this program at 136 different institutions during the summer of 1960.

State Academies of Science

This program provides aid to State Academies of Science and similar organizations for programs designed primarily to increase our young people's interest in science. Academies of Science are uniquely qualified for implementing programs of this type because of their active involvement with Junior Academies of Science and because of the broad diversification of professional talent represented in the academies' memberships. As the focal point for scientific interest in a region or community, each academy of science has an unusual opportunity to marshal all local and regional science resources in behalf of improved science education.

Programs of the separate academies cover a broad spectrum of activities: visiting scientists programs; special field trips; expanded junior academy activities; preparation of instructional material for teachers in connection with science fair programs; joint conferences of high school science teachers, college scientists, industrial scientists, and school administrators; etc.

During fiscal year 1960, a total of 43 grants were made to 28 State academies, 5 metropolitan academies, and 2 museums.

Science Career Information

Through this program the Foundation makes grants to scientific organizations for administering the preparation and distribution of career-guidance materials which give authoritative information to students considering professional careers in the various fields of science.

Ten grants were made to the: American Meteorological Society, American Society of Zoologists, American Institute of Biological Sciences, Botanical Society of America, Society of American Bacteriologists, Metallurgical Society of AIME, American Institute of Physics, American
Chemical Society, Council of Chief State School Officers, and National Academy of Sciences.

**College Programs and Teacher Improvement Programs**

The basic objectives of these programs are the improvement of science education and the development of more well qualified scientists and engineers. These programs provide opportunities for the undergraduate to improve his understanding of science, mathematics, and engineering, as well as assist teachers in developing their subject-matter backgrounds in these areas.

**Visiting Scientists (Colleges)**

This program facilitates visits by distinguished scientists to colleges and small universities for periods of two or three days to give lectures, to conduct classes and seminars if desired, and to meet students, faculty members, and administrative officers on an informal as well as formal basis in order to stimulate interest in science. These visits also make it possible for smaller institutions to become aware of developments in specialized fields of science and technology not commonly represented on the small college or university campuses. The program is administered through grants to appropriate professional scientific societies.

It is estimated that approximately 1,500 visits will be made to colleges during 1960–61, and that about half the colleges in the Nation will receive visiting scientists who represent one or more disciplines.

**Visiting Scientists (Foreign)**

Under this program grants are made to national professional societies to arrange for the visits of eminent foreign scientists to the science departments of our major colleges and universities. Such visits are usually for a period of a few weeks to several months. The visiting foreign scientists give lectures, conduct seminars, and meet with students and faculty with the objective of augmenting the quality of the research and educational activities of these institutions. Through these visits, leaders of American science are able to become better acquainted with the current state of knowledge in various scientific and engineering disciplines throughout the world.

**Undergraduate Science Education**

The Undergraduate Research Participation Program makes it possible for educational institutions to provide research training to high-ability undergraduates who have potential for scientific research and college teaching. This research experience is also intended to encourage participants to pursue graduate work in science. The Undergraduate Research
Training Program enables institutions or departments without active research in progress to initiate an investigative activity in which undergraduates could participate.

The 490 grants made in 1960 will help provide 3,338 undergraduates with a research experience in a variety of disciplines in the mathematical, biological, physical and engineering sciences, certain of the social sciences, and experimental psychology.

*Research Participation for Teacher Training*

Through this program, an opportunity is offered to teachers from secondary schools and small colleges to participate in scientific research during the summer. Initially the primary objective of this program, which began in 1959, was to improve the teaching of science through enlivening research experience provided teachers. However, with the development of this and other programs for teachers, emphasis has shifted somewhat to the objective of strengthening the Nation's research potential by providing teachers with the incentive and opportunity to become actual contributors to scientific knowledge. Recognizing that research and teaching are not mutually exclusive activities, the primary objective of developing teachers as teachers remains.

In fiscal year 1960, a total of 87 grants were made to educational institutions, making it possible for approximately 750 (500 secondary school and 250 college) teachers to obtain research experience during the summer of 1960.

*Supplementary Training for Science Teachers*

This program is aimed at improving the quality of science teaching at all educational levels through specialized conferences, workshops, etc., often of an experimental character. Programs may take the form of conferences directed toward improving instructional techniques, instruction in recent scientific advances, or inquiries into means of fostering new lines of educational scientific activity. NSF supported 41 of these projects in fiscal year 1960 with 4,000 teachers participating.

*Special Field Institutes*

Special Field Institutes supplement the advanced educational opportunities presently provided by university graduate schools or other advanced training centers for alleviating shortages of personnel in specialized scientific areas of critical importance in academic as well as scientific circles. These institutes are commonly cooperative graduate programs that assemble limited staff resources from several campuses and include industrial and Government scientists with unique specialization. Convening for a limited period of time to organize knowledge in un-
charted areas and to instruct research workers, faculty members, and postdoctoral and advanced predoctoral students, these institutes provide a well-conceived, short-term program of advanced study not readily available in usual graduate school situations.

Sixteen grants were made in 1960 for dealing with current advances in such fields as theoretical physics; mathematics and statistics; geophysical, oceanographic, and engineering applications of fluid dynamics; ethnography and anthropology; forest biology; marine sciences; and dynamical astronomy.

Public Understanding of Science

Under the Public Understanding of Science program, support is provided to educational institutions and scientific organizations to assist in developing ways of improving the lines of communication between the scientific community and the lay public in order to develop a broader concept of the impact of science upon the economy, welfare, and security of the Nation.

Since information on science is presented to the public primarily through the mass circulation media, initial experimental efforts are being directed toward steps to improve the quality and quantity of science news appearing in such publications.

These efforts in 1960 consisted of 13 grants for activities, such as conferences of scientists and newspaper editors, workshops for science reporters, and seminars for experienced science writers. Approximately 85 editors, 150 reporters, and 200 professional science writers participated.

Course Content Improvement Programs

Modernizing the content of science and mathematics curricula and courses, as well as all types of aids to learning and teaching, is essential to upgrading education for today's age of science. Content, adapted to the learner's level, must continuously reflect science as on-going inquiry and science at the level of understanding achieved by current knowledge. The purpose of the Foundation's Course Content Improvement Programs is to provide support for projects which engage the Nation's finest talent in the difficult and urgent task of achieving these goals.

These programs have evolved steadily since 1954. The complexity of problems in this domain, together with their far-reaching implications, led to an initially cautious approach through relatively small grants for a variety of exploratory studies. Support was increased considerably in fiscal years 1957 and 1958, when the first major effort was launched—the development of a new high school physics course. The results and
success of pilot projects, along with growing realization among first-rank scientists that such efforts merit high priority among their responsibilities, justified a further substantial increase to about $6 million annually in fiscal years 1959 and 1960.

First priority has thus far been given to new courses and materials for secondary schools, nearly 85% of program funds being allocated to this educational level during the period 1954–1960. In addition to continuing substantial support for high school projects, major effort must be focused upon the improvement of college and university programs, both through undertakings involving nationwide teams of scientists, mathematicians, and engineers and through modernization of curricula and courses within the great diversity of higher educational institutions and scientific and engineering fields. Also, recognition of the vital importance of elementary and junior high school experience in developing proper attitudes and laying the groundwork for subsequent schooling makes imperative a thorough study of science and mathematics curriculum improvement at this level.

Evaluation of projects supported by these programs points up two important aspects of course content improvement: first, assurance of excellence in content, for which perhaps the best guarantee is development and constant improvement of materials by top-level scientists, working with outstanding teachers and other experts; second, determining pedagogical feasibility through school trial, careful study of results, and revision of materials based thereon—an integral element in most projects. The widespread interest in course content developments is reflected in the great number of requests for information received by the projects, the Foundation, and other organizations. Substantial interest is also emerging in Europe, Asia, South America, and other parts of the world.

Course Content Studies and Development

Elementary-Junior High School

Foundation support for course content studies and development for elementary and junior high schools continued to be quite limited in fiscal year 1960 because further study of the problems involved and clarification of the Foundation's responsibilities are still required. These studies are now underway.

Another important need is an effort by scientists to identify significant content and to experiment with materials for pupils and teachers. The University of California received a grant to continue its interdisciplinary project on science for the first six grades; the University of Illinois, a grant for experimental work on instruction in principles of physical
science focused on astronomy. The basic importance of mathematics content throughout the elementary and secondary curriculum is conceded by all; the School Mathematics Study Group is continuing its highly promising work on sample courses for grades 7 and 8, and beginning the preparation of material for grades 4 through 6.

High School

Educational Services Incorporated received a grant to complete the first phase of work on a new high school course prepared by the Physical Science Study Committee. As the result of a 4-year effort by some of the Nation's most notable physicists, most materials for this course are now available to all interested schools. Some 30,000 students in 650 schools have already taken the course.

The School Mathematics Study Group received further support through Yale University for revision of sample textbooks and teacher's commentaries for grades 7 through 12, materials for teacher education, special materials for gifted students, and further evaluative studies. The American Institute of Biological Sciences was granted additional funds for efforts by the Biological Sciences Curriculum Study to devise and test textbooks, laboratory and field studies, teacher education materials, and other aids for high school biology. In chemistry support was given to two projects. Grants were made to Earlham College for the Chemical Bond Approach Project to prepare a second version of a text and laboratory guide for trial in some 50 schools during 1960-61, followed by a definitive edition to be published for general use. The University of California received funds for the Chemical Education Materials Study, which is beginning to devise and test text, laboratory, film, monograph and other materials for another type of high school chemistry course.

A related and difficult problem is that of helping teachers and school administrators learn more about new curriculum developments sponsored by various foundations and organizations. One approach will be tried by the National Council of Teachers of Mathematics through a grant for a series of eight regional conferences of mathematics supervisors.

College and University

Projects at colleges and universities follow three general patterns. One pattern involves a conference, series of conferences, or committee study to examine a field and define broad guidelines for curriculum reform. Support was provided for such studies on: introductory physics courses; chemistry for non-majors; and the undergraduate curriculum for chemistry, civil engineering, chemical engineering, sanitary engineering, experimental mechanical engineering, and anthropology.
A second type of activity, which may evolve from a project of the first sort, is the formation of a continuing body to conduct basic studies, provide liaison among specific course-content projects, supply information about developments, and stimulate efforts on the part of individual institutions or groups of colleges. The Mathematical Association of America received a grant to enable its Committee on the Undergraduate Program in Mathematics to assume this responsibility for that field, and comparable commissions concerned with college physics and experimental mechanical engineering have been recommended by the conferences in those fields.

The third kind of undertaking in the college and university studies category is the development of a specific new course which promises to be of wide interest and which includes elements of a truly novel nature. In this area grants were made to Harvard University for a new introductory biology course, to Ohio State University for work on a new laboratory program in organic chemistry, to Lehigh University and North Carolina State College for coordinated projects in experimental mechanical engineering, and to the Massachusetts Institute of Technology for a laboratory course on the principles of instrumentation.

**Supplementary Teaching Aids**

The objective of the Supplementary Teaching Aids program is to support the development of such aids to learning as new laboratory apparatus, motion pictures, and television presentations which have been designed to extend the range and scope of science, mathematics and engineering courses in significant ways.

For the design and development of prototypes of new laboratory equipment, 32 grants were made in 1960. Projects include an educational wind tunnel using smoke to visualize air flow, a small hypersonic wind tunnel, stereophotomicrography for submacroscopic anatomy, demonstrations for use with overhead projectors, equipment for instrumental chemical analysis, design of inexpensive computers, and a low-cost mass spectrophotometer.

Two educational television projects were granted support. A series of eight half-hour programs produced under a grant to the University of California at Berkeley will enable Nobel Laureate Wendell M. Stanley and his colleagues in the Virus Laboratory to bring the story of modern virus research and its implications for basic biology to large audiences. The use of television in providing teachers of mathematics with background knowledge and a detailed understanding of new curricula is the subject of a project sponsored by the Minnesota Academy of Science.
Educational film projects in a variety of fields were supported. Anthropology films, sensitively edited, can give the student an understanding of unfamiliar cultures; with this purpose in mind, a grant was made to Harvard University for the completion of a series of documentary films on !Kung Bushmen of South Africa. Under grants to the State University of Iowa and the University of Minnesota, films on principles of fluid mechanics will be produced. Iowa also received a grant for films on the biology of slime molds and the use of these organisms in teaching. Yeshiva University was awarded support to begin a series of films for high school and college biology courses which endeavor to put the viewer in the position of an original observer of plants and animals as an attempt is made to uncover fundamental principles through close observation of organisms in their natural environments. Yale University has received support for a series of short films for advanced high school and college courses in chemistry. A grant to the University of Illinois provides for experimentation with the use of films in presenting demonstration classes on new approaches to the teaching of elementary school mathematics.

Scientific Manpower Program

The Scientific Manpower Program is responsible for carrying out those functions of the National Science Foundation Act which require the maintenance of a register and clearinghouse of information on scientific and technical personnel. Through this program the Foundation makes available information on the Nation's resources of scientific and technical personnel, both for the purpose of administering its own programs and for the provision of information as required by other agencies concerned with science-oriented programs. In addition to providing information on the Nation's collective resources of scientific manpower, the Register program makes possible the location and identification of individuals with specialized skills when needed for important Governmental purposes, including mobilization.

The National Register of Scientific and Technical Personnel

On January 1, 1953, the National Science Foundation formally established the National Register of Scientific and Technical Personnel, which is the only comprehensive program for registration of the Nation's scientists. Information on more than 127,000 scientists was collected by the National Register during 1954–55.

Scientists were recircularized during 1956–58 and the National Register for that period includes information concerning some 170,000 scientists. In addition, a "finder's list" is maintained which includes about
20,000 engineers representing different geographical areas and engineering specialties.

During fiscal year 1960 the principal activities of the National Register were directed toward: (1) preparing a report covering the collection, tabulation, and analysis of data which was submitted to the House Committee on Science and Astronautics in “A Study of Scientific and Technical Manpower”; (2) analyzing the data collected and issuing a summary report, “Salary Profile of Scientists in the National Register of Scientific and Technical Personnel, 1956–58”; (3) servicing requests for Register information from industry, the scientific community, Government agencies, etc.; (4) developing questionnaires, revising specialty lists, and coordinating cooperating society operations for the recirculation of registrants according to the two-year cycle plan; and (5) coordinating the actual mailings to the scientific community.

**A Study of Scientific and Technical Manpower**

In response to a request from the House of Representatives Committee on Science and Astronautics, the National Science Foundation submitted, in January 1960, a comprehensive report covering (a) the status of the scientific and technical manpower register and the Foundation’s manpower studies, and (b) the projected plans for the future, short-range and long-range, in these areas.

The report in summary made the following points concerning the National Register:

1. Approximately 90 percent of scientists in fields now considered of mobilization importance should be registered.

2. Certain applied and other science fields should be covered as they, in turn, are deemed important for this purpose.

3. Substantive information on employment and professional characteristics will be brought up to date at no longer than two-year intervals. Methods will be sought to maintain current addresses within one year.

4. Registration should be on a voluntary basis during peacetime. In a mobilizing situation, however, registration of scientists should be geared into other more comprehensive registration programs, some or all of which may be mandatory.

5. In view of the complexities of registering engineers, based on diverse training, types of jobs held, and the large number of engineers in the country, the Foundation has turned to the engineering profession to study this problem. The need for better information on numbers and professional characteristics of engineers is not questioned.
Salary Profile of Scientists in the National Register of Scientific and Technical Personnel, 1956–58

Salary information was published on some 137,000 full-time employed scientists, comparing fields of specialization, type of employer, work activity, level of education, and age group. The median annual salary for scientists employed full-time during the years 1956–58 was about $7,900. About 50 percent were in fields of chemistry and in life sciences, which include agricultural, biological, and medical sciences. Almost half the registrants worked for private industry or were self-employed; 28 percent were employed by educational institutions, and 19 percent worked for various Government agencies. Thirty-eight percent of the scientists reported that they were engaged in research, development, and design, and 16 percent reported that they were engaged in teaching.

Table 4.—Median annual salaries of full-time employed scientists, by field, 1956–58

<table>
<thead>
<tr>
<th>Scientific and technical fields</th>
<th>Number</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, all fields</td>
<td>136,808</td>
<td>$7,938</td>
</tr>
<tr>
<td>Agricultural sciences</td>
<td>9,479</td>
<td>6,625</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>17,616</td>
<td>6,934</td>
</tr>
<tr>
<td>Medical sciences</td>
<td>1,838</td>
<td>10,873</td>
</tr>
<tr>
<td>Psychology</td>
<td>10,938</td>
<td>6,856</td>
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<tr>
<td>Earth sciences</td>
<td>12,767</td>
<td>7,975</td>
</tr>
<tr>
<td>Meteorology</td>
<td>2,104</td>
<td>6,924</td>
</tr>
<tr>
<td>Geography</td>
<td>965</td>
<td>6,762</td>
</tr>
<tr>
<td>Mathematics</td>
<td>9,866</td>
<td>7,638</td>
</tr>
<tr>
<td>Astronomy</td>
<td>354</td>
<td>7,400</td>
</tr>
<tr>
<td>Physics</td>
<td>12,450</td>
<td>8,462</td>
</tr>
<tr>
<td>Chemistry</td>
<td>34,860</td>
<td>8,660</td>
</tr>
<tr>
<td>Chemical engineering</td>
<td>4,759</td>
<td>10,219</td>
</tr>
<tr>
<td>Sanitary engineering</td>
<td>3,330</td>
<td>8,465</td>
</tr>
<tr>
<td>Other engineering</td>
<td>12,836</td>
<td>9,069</td>
</tr>
<tr>
<td>Other specialties</td>
<td>2,646</td>
<td>7,359</td>
</tr>
</tbody>
</table>


Examples of Register Information Supplied During 1960

Register information on the professional and economic characteristics of U.S. scientists is made available to meet the needs of Government agencies and private organizations. In addition to the publication of Register materials, a number of special-purpose tabulations have been prepared. Generally, the Foundation makes available information in the form of statistical summaries. Individuals are identified only where
an urgent need exists, where other sources cannot be used, and when it is in the national interest.

Information from the Register supplied in 1960 included: identification of top-level physicists with knowledge of the Japanese language; salary information on psychologists, pharmacologists, pharmaceutical chemists, hydrobiologists, and oceanographers; identification of physi-
cists with optical specialities and foreign language ability; educational background of geneticists and professional characteristics of other selected biological scientists; identification of poultry science specialists; professional characteristics of astronomers; information on age distribution and doctoral degrees held by scientists in a number of sub-fields of experimental biology; and extent of foreign language proficiency of geologists.

1960–61 National Register Program

The Foundation obtains its data through contracts with eight professional scientific societies, each of which is responsible for a specific area of coverage of information required for the National Register. The eight contractors work with, and through, about 200 specialized societies which obtain registrations under common standards established by the Foundation. The scientific societies circularize individual scientists, members and non-members alike, to insure the most complete coverage possible. Cooperating societies include the American Chemical Society, American Geological Institute, American Institute of Biological Sciences, American Institute of Physics, American Mathematical Society, American Meteorological Society, American Psychological Association, and Federation of American Societies for Experimental Biology. The U.S. Public Health Service cooperates in the registration of sanitary engineers; the U.S. Civil Service Commission in the maintenance of a roster of selected Government scientists and engineers.

During the spring of 1960 the scientific societies and the Public Health Service mailed out the revised questionnaire and specialties list. Some 350,000 questionnaires were mailed and it is anticipated that a total of 250,000 scientists will be registered by the end of calendar year 1960.

The task of coding, editing, and IBM processing about 100,000 questionnaires is scheduled for completion by the fall of 1960. This information will permit the National Register to develop current data relating to the Nation’s supply, training, utilization, and general characteristics of scientific and technical personnel, and issue a preliminary report by the end of calendar year 1960. Processing of all questionnaires received will continue into 1961, and current plans are to prepare a final report of the data in the 1960 National Register by the end of calendar year 1961. Additional reports, as appropriate, will be prepared from data in the National Register.

Scientific Manpower Studies

The Scientific Manpower Studies activity is a part of the Foundation’s function of providing "... a clearinghouse of information covering all scientific and technical personnel ..." This program is directed toward meeting the scientific manpower information needs of Government
agencies, private organizations, and the public generally. Data on the
supply, demand, education, and characteristics of the Nation’s scientific
and technical personnel resources are provided through published mate-
rials and through special studies, memoranda, etc. The Scientific Man-
power Studies activity is the central program in the Federal Government
for the provision of these types of material.

The program in fiscal year 1960 was concentrated on three general
areas of study: improvement of basic data, demand studies, and scienc-
tific manpower in foreign countries. Funds provided to other Govern-
ment agencies, universities, and research organizations have made it pos-
sible to initiate studies to improve information in these areas.

**Manpower Studies Underway**

Among the more important specific studies either initiated this year,
continued as part of a series, or still underway from previous years are
the following: surveys of scientific, engineering, and technician employ-
ment in private industry (see table 5 for some of the results of the 1959
industry survey), State governments, colleges and universities, and
the Federal Government; a pilot survey of the employment of scientists
and engineers in local governments; studies of students enrolled for
advanced degrees; a survey of nonacademic mathematical employment;
a methodological study of the identification of scientific and technical
occupations in industry; pilot studies of the demand for scientists and
engineers in the chemical and electrical equipment industries; a follow-
up study of college graduates of June 1958 to determine employment and
advanced training patterns; an analysis of the characteristics and em-
ployment plans of science doctorates of 1959; a study of high school
backgrounds of doctorates of 1958; a registry of high school teachers of
science and mathematics; a survey of Federal support of science educa-
tion; a study of distinguishing characteristics of scientists and nonscient-
ists; a study of professional manpower in Communist China; a revision
of a study on Soviet professional manpower; and a followup study of
engineers and related occupations from census population sample surveys.

These projects conform to the general series of studies recommended
in *A Study of Scientific and Technical Manpower*, previously men-
tioned, and in the Foundation’s report, *A Program of National Informa-
tion on Scientific and Technical Personnel*. This latter report led to the
designation of the Foundation to act as a “focal agency” for the coordi-
nation of studies of scientific manpower within the Federal Government.
During the past year the Foundation has acted in this capacity in con-
junction with studies of several Federal agencies and is appointing an
Interagency Advisory Council in connection with this coordinating
responsibility.
<table>
<thead>
<tr>
<th>Occupational group</th>
<th>All scientists and engineers</th>
<th>Research and development</th>
<th>Management and administration of</th>
<th>Exploration</th>
<th>Production and operations</th>
<th>All other activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>All groups</td>
<td>764,100</td>
<td>236,800</td>
<td>40,300</td>
<td>65,200</td>
<td>14,300</td>
<td>294,000</td>
</tr>
<tr>
<td>Engineers</td>
<td>615,400</td>
<td>174,800</td>
<td>30,800</td>
<td>57,000</td>
<td>2,700</td>
<td>255,100</td>
</tr>
<tr>
<td>Chemists</td>
<td>71,500</td>
<td>33,900</td>
<td>5,000</td>
<td>3,600</td>
<td>200</td>
<td>22,500</td>
</tr>
<tr>
<td>Physicists</td>
<td>14,900</td>
<td>11,200</td>
<td>1,500</td>
<td>200</td>
<td>100</td>
<td>1,400</td>
</tr>
<tr>
<td>Metallurgists</td>
<td>11,400</td>
<td>4,100</td>
<td>1,100</td>
<td>1,200</td>
<td>(t)</td>
<td>4,400</td>
</tr>
<tr>
<td>Geologists and geophysicists</td>
<td>14,800</td>
<td>600</td>
<td>200</td>
<td>1,000</td>
<td>11,000</td>
<td>1,700</td>
</tr>
<tr>
<td>Mathematicians</td>
<td>11,300</td>
<td>6,200</td>
<td>700</td>
<td>500</td>
<td>100</td>
<td>2,500</td>
</tr>
<tr>
<td>Medical scientists</td>
<td>7,000</td>
<td>900</td>
<td>200</td>
<td>200</td>
<td>(t)</td>
<td>2,200</td>
</tr>
<tr>
<td>Agricultural scientists</td>
<td>5,600</td>
<td>1,200</td>
<td>300</td>
<td>300</td>
<td>(t)</td>
<td>2,100</td>
</tr>
<tr>
<td>Biological scientists</td>
<td>5,500</td>
<td>3,200</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>900</td>
</tr>
<tr>
<td>Other scientists</td>
<td>6,600</td>
<td>400</td>
<td>200</td>
<td>1,100</td>
<td>(t)</td>
<td>1,400</td>
</tr>
</tbody>
</table>

1 Less than 50 cases.

Note: Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Manpower Studies Published

Comparison of U.S. and U.S.S.R. Science Education—During the hearings on fiscal year 1961 appropriations before the Subcommittee on Independent Offices of the Committee on Appropriations of the House of Representatives, Foundation representatives were asked to provide a series of reports comparing science education in the United States and Soviet Union. This material was published as a part of the congressional hearings on the Foundation's fiscal year 1961 budget.

The following are among the major findings of this report on U.S. and U.S.S.R. education:

(1) A total of 46 million students are enrolled at all levels of formal education in the United States, and 36 million in the U.S.S.R. At the higher educational level there are nearly 3½ million enrolled in the United States and only 2.2 million in the U.S.S.R. As of 1959, about 8.3 million persons in the United States had graduated from college compared with about 3.7 million persons in the U.S.S.R.

(2) Higher education in the U.S.S.R. emphasizes engineering, science, and medicine; most diplomas are granted in these fields. Less than a quarter of the baccalaureates awarded in the United States are earned in these fields. Nearly one-third of the Soviet baccalaureates are in engineering, compared to about one-tenth in the United States.

(3) The U.S.S.R. currently has nearly 1 million professionally trained engineers, typically with at least a 5-year engineering-institute diploma. Engineers in the United States numbered about 850,000 in 1959, and perhaps a third or more of them did not possess a formal academic degree. Currently the U.S.S.R. is outproducing the United States in engineering graduates at a rate of approximately 3 to 1.

(4) Scientists and research scholars are developed in both countries through an exacting course of training at institutions of higher education. At the present time the United States has more than 135,000 persons who have earned a doctorate. In the U.S.S.R. there are nearly 105,000 persons with similar advanced degrees. About half of the U.S. doctorates are degrees in the natural sciences and engineering, while in the U.S.S.R. more than three-quarters are in science and engineering. Currently, the United States is awarding about 9,000 doctorates annually with about half in science and engineering. Annual production of similar degrees in the U.S.S.R. is now about 5,000 with about three-quarters in the sciences or engineering. (See figure 4.)

(5) Women represent a substantial proportion of the work force in both countries, particularly in the professional occupations. About two-thirds of the women professionals in the United States are teachers or nurses. In the U.S.S.R. education and medicine also account for about
two-thirds of the professionally employed women. However, in the U.S.S.R. about 16 percent of these women are in engineering and they represent nearly one-third of the total in the occupation. Less than 1 percent of U.S. engineers are women.

*Scientific Manpower—1959—Papers presented at the Eighth Conference on Scientific Manpower, held in conjunction with the annual meeting of the AAAS meeting in Chicago, December 1959. The conference theme was “Higher Education and Training in Emerging Fields of Science and Technology.”*
Statistical Handbook on Science Education.—A compilation of data on education, in general, and science and engineering education, in particular. This report is divided into three parts: the first is concerned with human resources data such as enrollments at all levels of education, degrees granted, number of teachers and faculty; the second with institutional, facility, and financial data such as number of schools, value of property, expenditures and income of institutions, and student support; and the third consists of appendix tables which contain more detailed information on the first two sections.

In addition, organizations which have received Foundation support for their manpower activities have released several reports, including “Identification of Scientists and Technical Personnel,” by Surveys and Research Corporation, Washington, D.C., and “The Science Doctorates of 1958 and 1959, Their Numbers, Background, and Employment,” by the National Research Council, Washington, D.C.
The fundamental purpose of the Foundation's program for the dissemination of scientific information is to make the results of research more readily available to scientists and engineers throughout the country. The Foundation, through its Office of Science Information Service (OSIS), is directing its efforts toward: (1) improving present scientific information services through the use of known and tested procedures, and (2) promoting a national research program for developing new techniques for handling information. As a part of this effort, NSF vigorously fosters increased cooperation and coordination among organizations active in this area, both within and outside of the Federal Government.

Program responsibilities cover four general subject areas: documentation research, foreign science information, scientific publications, and research data and information services. During fiscal year 1960, 184 grants and contracts totaling $4.8 million were awarded for these activities.

**Coordination of Scientific Information Activities on a National Basis**

Fiscal year 1960 marks the first full year of operations since assignment, by Congressional Act and Executive Order, to the Foundation of responsibility for national leadership in the scientific information field. The Foundation has taken steps to implement fully its role as coordinator of information activities throughout the country. This has involved the constructive evaluation of existing systems and practices for the dissemination of scientific information—providing support where necessary—and the development of solutions to problems through cooperation and coordination of the agencies and organizations concerned. The Foundation has supported and participated in an increasing number of meetings of representatives of Government and professional and private
groups throughout the country aimed at improving the effectiveness of information services in the various fields of science.

The Science Information Council, established by the Foundation in December 1958, has advised and made recommendations to NSF on a broad range of scientific information problems. It is composed of representatives of private industry, education, professional societies, Government, and others concerned with information problems.

**Coordination Within the Federal Government**

Considerable emphasis has been placed on closer coordination of scientific information activities of Federal agencies. In the first year since its establishment, the Federal Advisory Committee on Scientific Information (FACSI) has served as an effective forum for the discussion of common problems and as a mechanism for coordinating plans and suggestions for the improvement and expansion of agency programs for the dissemination of scientific information. (Membership consists of senior members of 17 Federal agencies, with significant scientific information programs.) In the translations area, for example, an ad hoc committee has worked effectively to develop the P.L. 480 program for the translation, overseas, of important foreign scientific literature requested by Government scientists.* Also related to the translation problem have been efforts during 1960 to coordinate the administration of mechanical translation research activities sponsored by several Federal agencies. This resulted in the formation of an Interagency Committee on Mechanical Translation Research. These two committees are part of the overall FACSI structure.

The full Federal Advisory Committee has participated in such matters as the development of a Federal policy for the support of non-Government publications, and the planning and operation of a program for obtaining cost data concerning scientific information activities of Federal agencies to help identify the size and scope of information activities within the Government.

Other interagency efforts illustrative of the coordinating role of the Foundation have included the convening of meetings of representatives of those agencies conducting scientific information programs in Latin American countries as a preliminary step to the possible development of a Governmentwide program in Latin America. Similarly, the Foundation has held interagency meetings to discuss the coordinate Government

* The Agricultural Trade Development and Assistance Act of 1954 (P.L. 480) as amended in 1958 permits financing of the overseas translation program with foreign currencies credited to the United States from the sale of surplus agricultural commodities abroad.
support of those abstract journals of special interest to the programs of one or more agencies.

Cooperation Among Private and Professional Organizations in the United States

In the field of scientific abstracting and indexing, support has been made available to the National Federation of Science Abstracting and Indexing Services (NFSAIS) in its efforts to coordinate and improve the work of organizations engaged in this field. In fiscal year 1960, such activities have included the preparation of a Bibliography of U.S. Abstracting and Indexing Services which has been compiled by the Library of Congress with the advice and assistance of the National Federation. The final list, which includes about 500 services, was published by the Federation in June 1960. Knowledge of the individual services will make it possible to effect cooperation on a wider, more comprehensive scale. Now under preparation is a union list of periodicals covered by member services of the Federation which will make it possible to identify gaps in coverage of important literature and also assist scientists to locate information more readily. In a third area of activity, the Foundation has enabled Federation representatives to visit the Soviet All-Union Institute of Scientific and Technical Information. All phases of the operations of the Soviet and United States abstracting systems were considered, as well as the possibility of exchanging materials and other cooperative measures.

In the area of foreign science information, for example, NSF has sponsored a working conference of officers and editors of 28 professional societies and academic institutions which administer the translation and publication of important Soviet journals. The Foundation has sought particularly to stimulate interest on the part of societies to develop new or improved approaches to making available significant foreign science literature.

The Foundation has been devoting particular attention to the stimulation and support of discipline-wide studies of communication patterns and problems which could lead to fundamental solutions of information problems in all areas of science. This has involved meetings and close working relationships with representatives of the American Institute of Biological Sciences, the American Institute of Physics, and the American Chemical Society. Recently, discussions have also been held with organizations in the earth sciences and psychology fields concerning the undertaking of discipline-wide investigations of their information and publication problems.
Finally, in order to further cooperative activity between Government agencies and private organizations, the Foundation has undertaken separate actions designed to strengthen professional activities and representation in the field of documentation. In the first instance, the Foundation has supported the establishment of the Office of Documentation within the National Academy of Sciences-National Research Council. This Office provides advice on documentation to Government and private groups, serves as a focus in the United States for international documentation activities, and acts as a mechanism for U.S. participation in international meetings. In the second instance, the Foundation has assisted the American Documentation Institute, the leading organization and spokesman for documentation in the United States, to establish a full-time professional secretariat. This action will enable the Institute better to provide leadership, professional representation, and exchange of information in the field of documentation.

International Cooperation

The purpose of Foundation activities on the international level has been to bring about more effective cooperation among national and international organizations concerned with scientific documentation, and to stimulate international cooperation where this is likely to be more effective or economical than national action. To this end, NSF has been cooperating with various international bodies including the International Federation for Documentation (FID) and the Abstracting Board of the International Council of Scientific Unions (ICSU). NSF has also worked with the European Productivity Agency in studying means for establishing a European Translations Center.

A study of scientific information activities of international organizations is in preparation by the Library of Congress under a grant from the Foundation.

Scientific Information Notes

National and international developments in the dissemination of scientific and technical information are reported in *Scientific Information Notes*, published bi-monthly by the Office of Science Information Service. This journal (originally entitled *Science Information News*) is serving effectively as a vehicle for the exchange of information among groups working in the field.

Documentation Research

The Foundation objective in this area is to stimulate and support both the improvement of existing methods and the development of new methods for handling scientific information. In this context, informa-
tion handling includes analysis of the content of scientific publications, selection of significant information for abstracts and index data, coding for storage and retrieval, searching for stored information, identification of information for selective dissemination, and automatic translation from one natural language to another.

The major current trend in documentation research is the growing concentration on development of ways of using machines to store and search information and to process automatically the language of documents for information retrieval and translation.

**Use of Mechanical Aids**

Serious research on ways to use machines to supplement human skills in organizing and searching large volumes of information began about a decade ago and has proven to be an extremely complex and difficult problem. Research tasks in this area require the combined talents and insights of linguists, mathematicians, logicians, computer engineers and programmers, librarians, and other information specialists. Rising interest in the possibilities of mechanized information handling has resulted in expansion of the research effort. Projects which received NSF support during 1960 include the following:

1. A large-scale test program at Western Reserve University for evaluating mechanized procedures developed for the automatic processing and searching of metallurgical literature.

2. At Chemical Abstracts Service, a program on mechanization of processing and searching of chemical information, including research on the semantics of chemical literature.

3. A program to investigate the organization of large files of information with a multi-level structure and self-organizing capability at the Electrada Corporation.

Other active NSF-supported projects in this area include mechanized linguistic analysis of scientific texts and identification of significant words and phrases for indexing and abstracting (University of Pennsylvania), systematization and mechanization of the operations of information searching systems and development of a normalized language (ITEK Corporation), and comparative studies of various indexing and classification systems (Association of Special Libraries and Information Bureaux and the National Book League of England, and Hemen and Company of Washington, D.C.).

**Mechanical Translation**

With respect to research on mechanical translation, the Foundation is supporting two types of projects: (1) those concerned with developing
workable automatic procedures for translating foreign languages, and (2) those designed to provide better understanding of languages and of the basic problems of translation. One of the principal problems in mechanical translation is the lack of sufficiently precise knowledge about language to permit the preparation of machine instructions for dealing with syntactic structures and semantic choices.

The goal of research in mechanical translation is the eventual automatic production of translations from one language into another. This research may also contribute significantly to the development of procedures for automatic linguistic analysis for other purposes, such as automatic indexing and abstracting and mechanized search systems.

During 1960, Foundation-supported research on mechanical translation was expanded by a grant to the University of Washington for research into the lexicographical and structural problems of the Chinese language.

Continuing activities supported by grant include research on new logico-mathematical methods for the analysis of languages for machine translation (Cambridge Language Research Unit, England); also research on automatic translation of Russian into English (Harvard University and University of California) and German into English (Massachusetts Institute of Technology).

Patterns of Scientific Communication

Precise, objective knowledge of the information needs of scientists is being sought as the basis for improving the dissemination, organization, and use of scientific information. Such findings should be helpful in designing information storage and retrieval systems of the utmost utility and service to scientists.

During the past year a Review of Studies in the Flow of Information Among Scientists, prepared for the Foundation by the Bureau of Applied Social Research, Columbia University, was made available. This report discusses completed studies and various methods used for gathering data, synthesizes the findings wherever they are at all comparable, and suggests other approaches that seem feasible and promising.

The Case Institute of Technology was given a grant to determine the feasibility of developing measures of the value of recorded scientific information and of the productivity of scientists in terms of the new information their work produces.

Research Information Center and Reviews of Documentation Research

Continued support was provided for the maintenance of the Research Information Center and Advisory Service for Information Processing,
which had been established the year before at the National Bureau of Standards. The Center collects all publications and reports pertaining to research on the processing of information expressed in language and other nonquantitative forms, such as photographs and circuit diagrams; and from time to time it prepares and issues background or state-of-the-art papers on particular research areas. In addition, the Foundation let a contract to Documentation, Inc. for a thorough state-of-the-art survey of coordinate indexing which makes use of individual indexing terms or short compound terms that are combined during a search. The study will cover operating experience, research and experimentation, and unsolved problems; it will include discussion of the various refinements devised to enable this type of indexing to handle relationships of various kinds among terms.

Publications on Documentation Research

The fifth and sixth in a series of descriptive reports entitled Current Research and Development in Scientific Documentation were published in October 1959 and May 1960. This semiannual report describes research and development projects under way in the United States, as well as foreign projects on which information can be obtained. An important feature of the latest edition is a new section describing research on problems not immediately connected with scientific documentation, but whose solution is likely to have an impact on the future of information handling. It covers selected work in automatic programming, pattern and speech recognition, linguistic analysis, and artificial intelligence.

Descriptions of some 50 technical information systems were published in Nonconventional Technical Information Systems in Current Use, No. 2, September 1959, and its March 1960 supplement. This publication describes systems which embody new principles for organizing subject matter or which employ automatic equipment for information storage and search, or for preparation of indexes.

Foreign Science Information

In the foreign science area the Foundation reinforces efforts of American scientists to learn about research activities going on in all countries and to obtain the results of research published in all languages. Although formidable problems still remain, in recent years there has been a significant increase in the amount of source and translated material available to U.S. scientists.

Translations

Stimulated largely by NSF’s program, total U.S. and Western efforts in translation now cover some 5 percent of all Russian scientific and
technical journals. The Foundation, through scientific societies for the most part, supports the translation, in whole or in part, of 45 Russian journals. Other Federal agencies, foreign government organizations such as the Department of Scientific and Industrial Research in England, and certain private firms in this country have combined to make it possible for U.S. scientists to choose from 85 translated Soviet journals in various scientific fields.

There has also been a correspondingly larger output of selected article translations by private organizations. The availability of these items has been improving with the expansion of operations of the Special Libraries Translation Center, supported in part by the Foundation and by the Office of Technical Services of the Department of Commerce.

In addition to the increased availability of translations, there has been a marked growth in recent years in the volume of research journals published abroad, a large part of which normally flow to the United States. For example, in the Soviet Union alone some 300 new scientific journals have been published in the last 5 years. Similarly, this period marks the publication of 100 primary scientific journals in Communist China.

**Importance of Foreign Scientific Literature**

Stimulation of the broadening interest in foreign scientific literature has been a long term process. In part, this has resulted from Foundation initiative in granting funds for projects, such as cover-to-cover translations, travel to international meetings, or support for international conferences. Of equal importance has been the feedback to professional societies which has led to their growing interest in the problem.

Examples of this activity in 1960 include:

1. The American Mathematical Society which has received Foundation support for several years for translating Soviet mathematical material. The Society, with NSF support, is now studying the quality of mathematical research in China, Japan, and East Central Europe, in addition to the Russian translation work.

2. The American Institute of Biological Sciences (AIBS) which translates seven Soviet biological journals under grants from the Foundation. As a result of this experience and with Foundation aid, the AIBS sent representatives to the Far East to determine the kind of biological research now underway. The committee members are seeking ways to effect better communication and interchange of information with the Asiatic countries.

3. American Rocket Society representatives who contacted Japanese scientists at an international conference in Europe and completed arrangements to obtain English versions of Japanese...
astronautical reports for publication in the Society's journal. U.S. material is being sent to Japan in exchange.

Professional Society Survey of Foreign Scientific Literature

Foreign scientific literature now available, much in translation, provides evidence of the quality of the research underway throughout the world. As a result of stimulation and support by the Foundation, a number of professional societies are now undertaking surveys of those countries whose research effort is little known in the United States and whose languages are understood by few Americans. These surveys should provide guidance as to the advisability of expanding the translations program to include scientific journals of these countries.

Other Approaches

In November 1959, NSF sponsored a working conference of officers and editors of 28 professional societies and academic institutions translating Soviet journals to discuss means for improving the dissemination of translated journals among U.S. scientists. The Foundation also sought to stimulate interest on the part of the societies in developing other approaches in addition to cover-to-cover journal translations. Emphasis was placed upon selective translation, critical reviews, and state-of-the-art papers.

Discussions have been held with members of the Science Council of Japan concerning the possible publication in English of outstanding Japanese scientific periodicals in such fields as theoretical physics, astronautics, genetics, and virology. A grant was made to the National Diet Library to prepare an English version of the Index to Periodical Articles, Natural Sciences Section which will list virtually all scientific publications issued in Japan. The journal, published quarterly, will hereafter appear monthly.

The Foundation made available reviews of mainland Chinese science for publication in appropriate U.S. scientific society journals, including the reprint of a comprehensive review of Communist Chinese science published as a supplement to Science News Letter. In cooperation with the Association of Asian Studies, the American Mathematical Society, the Social Science Research Council, the Library of Congress, the Department of Agriculture Library, and the Department of Commerce, the Foundation is supporting studies to learn more about Chinese publishing practices, to evaluate their scientific output, to identify the literature already available in the United States, to enhance the availability of such literature, and to assure the translation of significant research results.
In Latin America, the Foundation is developing its information program in close cooperation with the Pan American Union, the Organization of American States (OAS), the National Academy of Sciences-National Research Council, and other Federal agencies. A grant has been made, for example, to the Pan American Union for a cooperative study of the resources, services, and potential for expanding documentation centers in Latin America. Agreement has been reached whereby the Centro de Documentación Científica y Tecnica de Mexico will undertake a comprehensive listing and evaluation of all Latin American scientific periodicals together with an analysis of present publication practices. The Foundation is working with the NAS–NRC Inter-American Scientific Cooperation Committee in developing approaches to the various existing information problems, including the identification of priorities, short-term, and long-term needs. OSIS has explored with several Federal agencies the extent of scientific information programs now being conducted in Latin American countries, together with problems and difficulties experienced and ways and means to bring about needed improvement.

**Public Law 480 Translation Activities**

An important adjunct to the Government effort to utilize more effectively the results of foreign research is the program of scientific information activities undertaken abroad by Federal agencies using foreign currencies accruing under Public Law 480. Under Foundation leadership, a translation project is underway in Israel and new programs were initiated in 1960 in Poland and Yugoslavia. A total of 31,420 pages of Russian, 9,032 pages of Polish, and 11,500 pages of Yugoslavian scientific material was in the process of being translated and distributed under this program at the end of the 1960 fiscal year.

The significance of this program lies in fostering increased availability of scientific research results to the United States and the rest of the world through close cooperation of scientific and governmental organizations within the countries concerned. Noteworthy has been the assistance of the scientists of Poland and Yugoslavia in calling to the attention of the Foundation the availability of newer and better scientific papers and books other than those which were known to the United States. It is expected that this program will stimulate these countries to publish more of their research results in English. Other countries may be expected to join in this effort.

**Studies on Foreign Scientific Information Activities**

The Foundation is supporting several studies on the organization and functions of scientific information activities abroad.
The study of scientific information activities of international organizations prepared by the Library of Congress has been extended to cover additional organizations.

A grant for a comprehensive study of the complex science information activities in the USSR was made to the Massachusetts Institute of Technology. This study is to include information on the recent major changes in the industrial information system, the newly formed Council for Cybernetics and its activities related to machine processing of information, as well as other heretofore unknown areas of such activities in the Soviet Union.

To enable U.S. scientists to develop foreign science information programs most suited to their needs and to facilitate exchange of information with their colleagues abroad, the Foundation has taken steps to make available relevant background information on foreign research to the U.S. scientific community. For example, in addition to the survey of mathematics research in Communist China, the Foundation has issued a grant to the American Association for the Advancement of Science for support of a symposium “Science in Communist China,” at which state-of-the-art reviews in various fields of science will be presented. Publication of these reviews is expected.

In this connection the directory prepared by the Scandinavian Council of Applied Research listing all research institutions and their publications in Norway, Sweden, Finland and Denmark, will be made available to U.S. scientists by the NAS–NRC under Foundation support.

It is also planned to have an international directory, prepared in Western Germany, updated and translated. This directory contains brief summaries on major research and educational institutions, manpower, and budgets in various countries of the world. The necessary additional work will be done in Germany.

Research Data and Information Services

Through this program, the Foundation has increased its efforts to develop means by which the many specialized data and information service centers in the United States can be coordinated as a national system for serving the needs of the entire science community. Because of the differing requirements for data and reference services and the economic factors involved, emphasis is placed on the improvement of information services in the broad disciplines and technologies which for the most part provide basic sources of information for the highly specialized services.
Science Information Exchange

During the past fiscal year, the Foundation led efforts among Government agencies to establish a Science Information Exchange to collect, correlate, and disseminate information and data about all current research tasks, publicly or privately supported, in the mathematical, physical, engineering, life, and social sciences. It is planned that this new clearinghouse service (SIE) will incorporate present activities of the Bio-Science Information Exchange cooperatively supported for several years by a number of Federal agencies. It will also be administered by the Smithsonian Institution.

Survey of U.S. Data and Reference Services

A contract has been negotiated with the Batelle Memorial Institute to prepare an inventory of specialized information services in the United States with a view to publishing a national directory of the scope and nature of their activities. The results of this survey will be of special interest to planners of new data and reference services and will also assist in promoting the more efficient use of existing facilities.

In the area of critically evaluated data, the Foundation has continued to support the coordinating activities of the Office of Critical Tables of the National Academy of Sciences-National Research Council.

As part of the effort to improve existing services, support has been provided to Chemical Abstracts Service for the study and development of new or modified existing techniques to improve user access and reference to this immense collection of information of interest to chemists and other scientists.

"Unpublished" Information

The program of the Foundation in this area seeks to provide for systematic public announcement and dissemination of all significant unclassified scientific and technological information which is not published promptly in scientific journals and books.

In 1960, support was continued to the Office of Technical Services, Department of Commerce, for expansion of its program for announcing and disseminating Government research reports, particularly those containing basic research information. Foundation support of the Science and Technology Division of the Library of Congress was for the continued expansion of its catalogs and bibliographic records of Government reports. This has permitted the Division's Reports Reference Center to perform more comprehensive literature searches and to provide a higher quality reference service for an increasing number of users.

The Foundation is supporting basic studies to determine the factors
which promote or impede the announcement and publication of information presented orally at meetings and those which influence the availability, announcement, and publication of scientific information contained in unclassified Government reports.

**Inventory of Federal Scientific Information Activities**

Since 1958, the Foundation has been conducting a survey of Government agencies with scientific information activities to determine the quantity and subject matter of the scientific reports which they issue, the availability of these reports to scientists outside the Government, and the policies and procedures of these agencies with respect to their scientific information programs. The data obtained from this survey are being published in a series of bulletins entitled “Scientific Information Activities of Federal Agencies.” The bulletins identify subject areas of agency research and development activities, names and types of information services provided, documents generated, how they are announced, and means for obtaining them. In 1960, three new bulletins were issued, covering the Office of Naval Research (NSF 59–19), The Department of Commerce—Part I (NSF 59–58), and the Government Printing Office (NSF 60–9). Others are in preparation and a contract has been let for continuing this effort during the next year.

**Scientific Publications**

The Foundation conducts and supports projects aimed at improving the effectiveness of the dissemination of scientific information through publication. Two classes of projects are supported: (1) those aimed at assisting present scientific publishing, and abstracting and indexing services; and (2) those directed toward developing new and improved systems for providing faster, more comprehensive scientific information at the lowest possible cost.

During fiscal year 1960, the Foundation’s continuing activities in support of scientific publication resulted in grants to 57 publications of various types. Uses to which these funds were put included: initiating needed new primary journals; assisting existing primary journals to publish cumulative indexes, eliminate manuscript backlogs, and meet other financial emergencies; enabling abstracting and indexing services to expand their coverage; supporting experimental journals; and publishing a number of significant single items which could not be published without subsidy, including monographs, long papers, symposium proceedings, reviews, bibliographies, and data compilations.

The principal trends in scientific publishing evidenced by 1960 fiscal year activities of this program are as follows:
1. Increased interest in finding out more about the existing situation in publishing.
2. Willingness to experiment with new publication techniques and methods.
3. Improvement of U.S. abstracting and indexing of scientific literature.
4. Discipline-wide studies of communications patterns and problems.
5. Coordination of support of scientific publications by Federal agencies.

**Situation in Scientific Publishing**

Attempts have been made in recent years by individual societies, journals, and disciplinary groups to obtain adequate background and "yardstick" data on scientific communication media in their fields of interest. These attempts, while often useful for individual segments of publishing, have not been comprehensive and inclusive enough to give a sufficiently clear picture of the scientific publishing situation on a national basis.

To remedy this deficiency and provide valuable knowledge for planning purposes, the Foundation in 1959-60 launched a series of national surveys on scientific communication media. Professional scientific societies were studied first, because they publish the majority of research journals. Data were gathered on dues structure, membership, annual meetings, and journal support; a report was published in the fall of 1960. A comprehensive survey of research journals is currently under way and will be followed by studies of scientific symposia and conference proceedings, and scientific monographs. In addition, the publication "climate" in industry is being studied and a report on this source of research publications will be completed in 1961.

**Experiments with New Publication Techniques and Methods**

Many scientific journals have been published for years in the same format and by the same printing procedures in spite of improvements in printing design, economics, and methods. However, recent publications problems and financial crises have encouraged publishers to consider new publication techniques and methods. Moreover, a few individuals and organizations have been investigating the possibility of different methods for publication, and the publishing of "experimental journals". As an example, *Chemical Abstracts* is receiving support from the Foundation to enable it to experiment with, and publish, a permuted title index to current chemical literature; and in the field of plant taxonomy a pilot project is being supported to permit machine handling of pertinent data.
for plant species so that valuable indexes can be produced that are not feasible with present methods.

**Improvement of U.S. Abstracting and Indexing of Scientific Literature**

The Foundation, in consultation with scientific societies, existing abstracting and indexing services, and the National Federation of Science Abstracting and Indexing Services, has sought ways to identify gaps in U.S. coverage of scientific literature and to take steps to fill these gaps. Where new services are required, the Foundation has aided their establishment (for example, *GeoScience Abstracts*). In other cases, the Foundation has sought to expand existing services to cover areas of the literature not now included in any U.S. service. During 1960, for example, the Foundation granted additional support to *Biological Abstracts* to continue its expansion of coverage of the biological literature. Discussions with interested scientists, with societies, and with existing services have set plans in motion to expand present services to cover adequately the literature of geophysics.

Other services which have been aided to expand their subject coverage, eliminate backlogs, prepare cumulative indexes, survive financial difficulties, and reorganize certain phases of their operation on a sounder basis include: *Mathematical Reviews*, *Meteorological Abstracts & Bibliography*, *Bibliography of Extraterrestrial Radio Noise*, *Index to the Literature of American Economic Entomology*, and *Annotated Bibliography on Operations Research*.

**Discipline-Wide Studies of Communications Patterns and Problems**

One of the more promising developments which could lead to fundamental solutions to the publications problems in important areas of science is the increase in discipline-wide studies of communications patterns and problems.

The American Institute of Biological Sciences, recognizing that the field of biology has become one of the most diversified and splintered of all fields of science, is currently planning a long-range study of biology publications problems. Foundation support has been given for an initial feasibility study and it is expected that further support will be needed for the projected major study. In addition, the AIBS, with support and encouragement from the Foundation, has initiated studies into the feasibility of a centralized editorial-business management office at the Institute for a group of biological journals. It is hoped that this study will demonstrate whether professional services can be made available to small journals on a cooperative basis, in cases where journals cannot afford such
services individually, but where the growth of literature has made it difficult for them to continue with only part-time volunteer management by interested scientists.

Although, in the field of physics, the American Institute of Physics has maintained high journal standards for many years, and competently investigated problems as they arose in that field, it launched with Foundation support a needed full-scale study project into physics documentation in general.

The American Chemical Society is continuing to study publications problems arising in chemistry in order that chemists may have the type of literature and source material most required.

Recently, organizations in the earth sciences and psychology fields have expressed interest to the Foundation in undertaking discipline-wide investigations of their publications problems.

Coordination of Support of Scientific Publications by Federal Agencies

The Foundation has held a number of meetings with representatives of other Federal agencies, to discuss and to coordinate Federal support of particular journals (especially abstracting journals) which are of special interest to the programs of one or more agencies. These meetings have concerned such publications as the Arctic Bibliography, Meteorological Abstracts & Bibliography, and Applied Mechanics Reviews.

In addition, the Foundation has initiated discussions by the Federal Advisory Council on Scientific Information, with a view to developing a Federal policy for the support of non-Government publications.
SPECIAL INTERNATIONAL PROGRAMS

Greater concern with international scientific programs began in 1954 when the Foundation accepted a portion of the responsibility for U.S. participation in the International Geophysical Year 1957–58. The Office for the International Geophysical Year was established in 1955 to carry out Foundation responsibilities in this activity; near the close of the IGY, the name was changed to the Office of Special International Programs.

Many other programs of the Foundation have with growth developed international aspects which are handled through the appropriate division or office.

The Office of Special International Programs has been assigned responsibility for directing the U.S. Antarctic Research Program (see pp. 61 to 66), an outgrowth of the International Geophysical Year, and for initiating and developing cooperative and experimental programs in international science. The Office also provides liaison for the Foundation with international science activities of other Government agencies, which in some cases calls merely for the exchange of information and in others for the recruitment of scientific experts for particular assignments.

International Geophysical Year

The International Geophysical Year (IGY) was an 18-month period extending from July 1, 1957, through December 31, 1958, during which the scientists of 66 nations conducted geophysical observations over the entire globe. Planning and coordination of the world-wide IGY program was carried out by a Special Committee of the International Council of Scientific Unions. The formulation and conduct of the U.S. scientific programs was directed by the United States National Committee for the IGY, established by the National Academy of Sciences as the U.S. adhering body to the International Council of Scientific Unions. The Foundation’s responsibility was to obtain and
administer Congressional appropriations for the program, which totaled $43.5 million, and to coordinate the interests of the U.S. Government in the undertaking.

The observational period of the IGY ended with the year 1958. However, by this date the collection of IGY data had only begun, and in fact is still going on; it is estimated that roughly 80 percent of the data is now available in the IGY World Data Centers. The IGY was followed by a program known as International Geophysical Cooperation–1959 (IGC–59) during which geophysical research in certain fields was continued on an international scale. The data from the IGC–59 effort are also being collected in the IGY World Data Centers.

During the past year the Foundation concluded its use of IGY appropriations by making grants for post-observational analysis of the IGY data, principally of an interdisciplinary research nature, and for the work of the IGY World Data Centers to fulfill their responsibilities for the collection, interchange, and publication of the data.

**IGY World Data Centers**

The three IGY World Data Centers are World Data Center A in the United States, World Data Center B in the USSR, and World Data Center C maintained by eight nations of Western Europe, Japan, and Australia. These Centers will house three complete sets of data, available to the scientists of the world. Copies of the data may be obtained from the Centers at a nominal cost to cover reproduction costs.

World Data Center A is organized into 11 subcenter archives, on the basis of different IGY disciplines, located at various institutions and agencies throughout the United States. A central coordination office for the U.S. World Data Center is maintained by the National Academy of Sciences in Washington, D.C.

All World Data Center A discipline subcenters will issue cumulative six-monthly catalogs in the calendar year 1960, both as an indication of data flow and as a users' index. The coordination office of World Data Center A will publish these cumulative six-monthly catalogs in combined form. Publications based on IGY observational data are being issued under disciplinary-report series by the appropriate archive subcenters and under a general-report series by the coordination office.

Communications regarding IGY data interchange in general should be addressed to: Director, World Data Center A, National Academy of Sciences, 2101 Constitution Avenue, NW., Washington 25, D.C. Inquiries concerning data in specific disciplines should be addressed to the appropriate subcenter listed below:

1. IGY World Data Center A: Airglow and Ionosphere; Cen-
tional Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colo.

2. IGY World Data Center A: Aurora (Instrumental); Geophysical Institute, University of Alaska, College, Alaska.

3. IGY World Data Center A: Aurora (Visual); Rockefeller Hall, Cornell University, Ithaca, N.Y.

4. IGY World Data Center A: Cosmic Rays; School of Physics, University of Minnesota, Minneapolis 14, Minn.

5. IGY World Data Center A: Geomagnetism, Gravity, and Seismology; Geophysics Division, U.S. Coast and Geodetic Survey, Washington 25, D.C.

6. IGY World Data Center A: Glaciology; American Geographical Society, Broadway at 156th Street, New York 32, N.Y.

7. IGY World Data Center A: Longitude and Latitude; U.S. Naval Observatory, Washington 25, D.C.

8. IGY World Data Center A: Meteorology and Nuclear Radiation; National Weather Records Center, Asheville, N.C.

9. IGY World Data Center A: Oceanography; Department of Oceanography and Meteorology, Agricultural & Mechanical College of Texas, College Station, Tex.

10. IGY World Data Center A: Rockets and Satellites; National Academy of Sciences, 2101 Constitution Avenue, NW., Washington 25, D.C.

11. IGY World Data Center A: Solar Activity; High Altitude Observatory, Boulder, Colo.

Annals of the IGY

A comprehensive history of the IGY, including its organizational structure, planning phases, operational aspects, and results, is being published in a series of volumes entitled, Annals of the International Geophysical Year, by the Pergamon Press, Ltd., London. The following volumes have been published to date:


Volume IIA (1959)—Parts I–IV, The International Geophysical Year Meetings (first four CSAGI assemblies).


Volume VII (1959)—Parts I–III, IGY Instruction Manuals
Future volumes of the Annals will include key scientific data in summary working form and results of the program. Present international agreements provide for at least 25 additional volumes of the Annals.

Digests of most recent IGY results continue to be issued monthly in the IGY Bulletin, published by the U.S. National Committee for the IGY, National Academy of Sciences, Washington, D.C.

Foreign Science Program

During 1960, the activities of the Foreign Science Program have been mainly of a planning and liaison nature. A modest number of grants, however, have been made.

A grant to the National Academy of Sciences is supporting an exchange of scientists between the United States and the USSR, implementing the Bronk-Nesmeyanov Agreement signed in July 1959 between the Academies of Science, of the two countries. The Agreement, which covers a 2-year period, provides for about 40 exchange visits from each side by scientists who will lecture and observe research, plus an indefinite number of invitations to scientific meetings. Arrangements are now under way for visits by 13 Americans and 8 Soviets. Invitations have been sent by the National Academy of Sciences to the Soviet Academy for Soviet attendance at 24 scientific meetings; to date, nine Soviet scientists have attended two of these meetings. The Soviet Academy has arranged invitations for U.S. attendance at two meetings in the USSR. Discussions have begun in connection with the organization of a joint symposium in the field of radioastronomy.

To develop more comprehensive firsthand information on specific areas of science in foreign countries, grants were made to several distinguished American scientists for studies of microbiology in Japan, a review of research in geography in Western Europe, and a study of mathematical activity in Poland. These grants will result in reports that will be useful to the Foundation in its future programming and also may be distributed to U.S. research workers in these fields.

Assistance was provided to a number of outstanding American scientists to attend an international conference in Israel on “Science in the Advancement of New States.” Subjects such as what science might do
to bring about the transformation of underdeveloped countries, future possibilities of energy sources, climate control, education and training, and international exchange of information were discussed. Attendance at this conference will serve to increase interest and provoke thought in this area among key American scientists.

International Science Education Program

The primary objective of this program is to strengthen our Nation's total scientific effort through improved programs of science education by providing American scientists and educators with the opportunities to join their foreign colleagues in endeavors that may prove of great value in raising the quality of science education in the United States. At the same time these program activities may result in raising the standards of education in the sciences throughout the Free World.

During fiscal year 1960 the Congress broadened the Foundation Act to authorize international scientific activities, previously centered around a one-way flow directed towards improving education in the sciences in the United States. Beginning in the past year, a number of cooperative programs were entered into or considered in which a two-way flow led to the exchange of ideas and information of great potential benefit to scientists and science educators in other countries, as well as to those in the United States. For example, inclusion of over 70 leading science teachers from abroad in the 1960 NSF Summer Institutes proved of considerable worth to the institutes program. It is expected that these foreign teachers will play key roles in improving science education in their own countries based on the experience gained at the Foundation-supported institutes. Another example of such programs is the extended support of science-curricula survey projects sponsored by international scientific organizations.

In general, the activities of the International Science Education Program are considered to be experimental in design and/or concerned with cooperative programming with international regional organizations or foreign institutions. Considerable attention has been given to assuring appropriate American participation in the ever-increasing number of cooperative projects being undertaken through the Office for Scientific and Technical Personnel of the Organization for European Economic Cooperation (OEEC). Similarly, attention is being devoted to developing and supporting cooperative projects with the science education components of the North Atlantic Treaty Organization (NATO), the Organization of American States, and the Asia Foundation.
During the 1960 fiscal year modest support was offered to projects developed under the three general program categories: curricula development programs, teacher-training programs, and science student programs. A new category—experimental cooperative programs—was initiated during the year.

**Curricula Development Program**

In conjunction with the serious attention being given to improving secondary school and undergraduate science curricula in the United States, support was given for studies of science subject matter taught in educational systems abroad. Grants were made for studies conducted by recognized American professional groups, in cooperation with foreign scientists and educators, for survey projects undertaken by approved exchange missions under the Lacy-Zaroubin Agreement, for international conferences on science education, and for the translation of foreign educational materials.

**Teacher-Training Program**

Under this program international cooperative projects were supported that were directed toward the quality improvement of U.S. teacher-training programs. Distinguished lecturers and leading science teachers from abroad participated in 1960 summer institutes. Furthermore, United States representation was assured at OEEC-sponsored teacher-training seminars and conferences. In addition, considerable staff assistance was given to the Asia Foundation in organizing two pilot teacher-training 1960 summer institutes in Pakistan and to the Organization of American States in presenting an experimental science institute in Argentina.

**Science Student Program**

Through these projects support was provided for science education activities that enabled science students and scholars to participate in international science education programs aimed at keeping them informed of latest scientific knowledge achieved abroad. Foundation support was offered to professional societies to administer a Visiting Foreign Scientist Program under which eminent foreign scientists visited the science departments of U.S. colleges and universities for the purpose of augmenting the quality of the research and educational activities at these institutions. Support was extended to International Special Field Institutes providing scholars and students from various nations with the opportunity to meet and exchange ideas and developments in a special field of scientific interest. The NATO program of advanced-study insti-
tutes has aroused wide interest, and participation of American graduate students and senior scientists was made possible through Foundation travel support.

**Experimental Cooperative Program**

As its role in international science becomes increasingly important, the Foundation is exploring methods of fostering closer contact between scientists and science teachers in the United States and Latin America. Successful Latin American participation in projects under the three previous general categories has been arranged. A further significant step in this direction was taken during the year. A pilot experimental exchange program, cooperatively supported by the Foundation and the Organization of American States, was planned making it possible for a limited number of U.S. scholars to take part in science activities in Latin America and for Latin American scientists to take part in research and training activities in the United States during the two-year period of July 1960–62. Responsibility for fostering these exchanges of senior staff members has been essentially placed on the institutions of higher learning concerned.

**Relationships With International Science Programs of Other Government Agencies**

**Liaison with Science Officers of the Department of State**

The Office of Special International Programs has continued to provide liaison for the Foundation with the science attaché program of the Department of State. At the request of the Science Adviser to the Secretary of State, briefing sessions for newly appointed Science Officers have been arranged prior to their departure for overseas posts in order to acquaint them thoroughly with Foundation programs. The suggestion has been made that Foundation staff members traveling abroad visit the Science Officers in the respective areas, and up-to-date information on the Foundation is furnished the Science Officers through a continuous flow of its publications.

**Cooperation with the International Cooperation Administration**

In 1957 the Foundation entered into a participating-agency service agreement with the International Cooperation Administration. Under its terms the Foundation agrees to secure, on a reimbursable basis, the services of certain scientific and technical experts for particular assignments in various countries, as requested by the International Cooperation Administration. During 1960 these requested services were for assignments in Indonesia, the Philippines, and Europe.
A science faculty member on leave from Louisiana State University made a comprehensive survey of Indonesian science as consultant to the Council for Sciences at Djakarta, Indonesia, from October to January. A formal report based on the survey was furnished to the Council, which included a critical evaluation of science facilities and activities and recommendations for their improvement under the supervision of the Council.

A similar survey of Philippine science was carried out between February and May by a scientist on leave from the faculty of Yale University as consultant to the Government of the Philippines to assist its National Science Development Board. The initial portion of the survey, completed in 1959, proved so valuable to the Board that the services of the consultant were requested for a second assignment in 1960. These surveys carefully evaluated Philippine science and recommended methods of improvement.

For U.S. representation in the European area, requests were made for experts to participate in meetings called by the Organization for European Economic Cooperation. These meetings related to the work of the two science components of the OEEC—the Applied Research Division and the Office for Scientific and Technical Personnel. Qualified scientists and technical experts drawn from universities, industry, and Government were recruited to represent the United States at various meetings.
Background of Survey Program

From its inception, the National Science Foundation has been concerned with the measurement and appraisal of the national research and development effort. Prior to the work undertaken by NSF in this field, little had been done. NSF's pioneering studies, conducted by its Office of Special Studies, have provided the first systematic and comprehensive information on the finances of research and development in the United States.

The Foundation began with a study of the Federal Government, and published the results first in 1953 under the title Federal Funds for Science. Prior to 1952, the U.S. Bureau of the Budget compiled statistical information on funds obligated by Federal agencies for research and development at colleges and universities. As these statistics became more important as bases for science policy formulation, the Foundation assumed responsibility for their annual compilation. Over the years, the study has expanded so that now Federal Funds for Science—an annual publication—includes the entire Federal program for research and development. The most recent issue contains a chart (fig. 5), indicating the trends in Federal expenditures and obligations for the past 20 years.

This initial effort to survey the Federal research and development program brought to light the need for information on the national scientific research and development effort. Further, the President's Executive Order 10521 of March 1954 specifically directed the National Science Foundation "to make comprehensive studies and recommendations regarding the Nation's scientific research and its resources for scientific activities."

A series of surveys begun in 1954 represents the first comprehensive examination of the Nation's research and development effort in terms of both dollars and manpower. Findings of the initial surveys were
published in seven complete reports. They form the basis for a statistical time series and provide benchmark information on the national R&D effort. The total effort is analyzed in terms of four sectors of the economy—the Federal Government, private industry, the colleges and universities, and "other nonprofit institutions."

Dr. George B. Kistiakowsky, Special Assistant to the President for Science and Technology, at the Tenth Anniversary Dinner of the National Science Foundation, May 12, 1960, referred to this phase of the Foundation's interest as follows: "Until the midperiod of the decade, economists had to guess the amount of research and development per-

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Figure 5. Trends in Federal Research and Development Budget.


NOTE: Data include funds for both conduct of research and development and increase of R&D plant. Pay and allowances of military personnel in research and development included in totals in 1955 and subsequently.

Sources: Bureau of the Budget; National Science Foundation.
formed within the United States. At that point, the National Science Foundation, on the basis of a thorough survey of the 1953 period pegged the dollar figure for R&D, not at the estimated $2.5 billion, but at more than double that amount—$5.4 billions. Today it has more than doubled again, the Foundation's estimate being on the order of $12 billion.”

The 1954 series broke new ground. For the first time, these surveys gave a systematic picture of how much research and development was being done in each of the various fields of science and in each sector of the economy, how much the Nation was spending on research and development, who was footing the bill, who was performing the work, and how many persons were engaged in research and development in each of the sectors and in each scientific field.

Trends in Total R&D Effort

Information provided in the 1954 and subsequent statistical series shows that there has been a rise in current dollars expended for scientific research and development for each year since the first study. The 1958 total, $10 billion, was almost double the $5.2 billion estimated for 1954. Figure 6 shows the totals for research and development and the portions going for basic research for five years beginning with the year 1953-54.

Projected estimates of national totals have been published for the years 1959 and 1960—$11.2 and $12.4 billion, respectively. Figure 7 shows the increase in R&D funds for each year, by sector. The increase in research and development since the base year is primarily owing to a rise of almost 160 percent in the volume of funds used in the performance of research and development by private firms and certain types of related organizations which compose the “industry sector.” Funds for performance of research and development by industry rose from $3.6 billion in 1953-54 to a projected $9.4 billion in 1959-60. During the same period, the other three sectors—the Federal Government agencies, colleges and universities, and other nonprofit institutions—also increased their expenditures for the performance of research and development.

These aggregates provide overall trend information. Equally important, however, is the knowledge afforded by each annual survey regarding the activities in each sector. Figures 8, 9, and 10 present the composition of each sector. Figure 8 shows that two industries, aircraft and parts and electrical equipment and communication, performed together 54 percent of the total for the industry sector during 1958.

*This figure was originally estimated at $5.4 billion but later revision places the 1953-54 estimate at $5.2 billion.
Figure 6. Funds Used for Basic Research Performance and for Total Research and Development in the United States, 1953–58.

Source: National Science Foundation, 1960.

Figure 7. Funds Used for Performance of Research and Development in the United States, by Sector, 1953–60.

NOTE: Data on R&D funds for 1956–57 and 1957–58 are revised.
Source: National Science Foundation, 1960.
Figure 8. Funds Used for Performance of Research and Development, by Industry, 1958.

![Graph showing funds used for research and development by industry, 1958.]

NOTE: Industry statistics are based on nationwide surveys of individual manufacturing and nonmanufacturing companies. They include the R&D activities of Federal contract research centers administered by industrial firms, but do not cover certain industry-oriented organizations, such as trade associations, that account annually for an estimated 1 percent of total industrial R&D performance.

Source: National Science Foundation, 1960.

Figure 9 indicates the analysis of certain research expenditures in colleges and universities, by organizational unit, and by character of the work. The data support the view that colleges and universities proper are the primary performers of basic research within the organizational complex of higher educational institutions. Figure 10 gives the components of the sector, “other nonprofit institutions.” It may be seen that privately endowed foundations uphold their tradition of support of basic research.

Detailed data on the intersectoral flow of funds for research and development are available for the year 1956–57 (table 6) and these may now be compared with the primary data published for the year 1953–54 (table 7). These transfer tables serve as a statistical framework for dealing with the involved pattern of research and development financing in the United States. By showing all four sectors as original sources and as ultimate users, the tables provide 16 possible financial relationships (including intrasectoral financing), 10 of which emerge as major working relationships reflected by the surveys.

Comparison of these tables indicates the growth in volume of funds in each sector. The major role of industry as a spender for performance of research and development is highlighted by the magnitude of its
Figure 9. Expenditures for Separately Budgeted Research and Development in Colleges and Universities, by Character of Work and Organizational Unit, Fiscal Year 1958.1

Expenditures for separately budgeted research and development form one component of the total for colleges and universities. The remainder is comprised of departmental research and indirect costs of research.

Source: National Science Foundation, 1960.

Figure 10. Funds Used for Research and Development, by Type of Nonprofit Institution and Character of Work, 1957.

1 For example, RAND Corp., which is an independent organization, Brookhaven National Laboratory, and National Radio Astronomy Observatory, the latter two being administered by Associated Universities, Inc.

2 This group includes science museums, zoological and botanical gardens, and arboretums. Not shown are $0.3 million for applied research and development.

Note: Data are based on reports from organizations in their role as sources or sponsors of research and development.

Source: National Science Foundation, 1960.
Table 6.—Transfers of R&D funds, by sector as source and as performer, 1953–54 (revised) a
(Millions of dollars)

<table>
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<tr>
<th>Sources of R&amp;D funds, by sector</th>
<th>R&amp;D performers, by sector</th>
<th>Percent distribution, R&amp;D sources</th>
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<td>Federal Government agencies</td>
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<td>Colleges and universities</td>
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Percent distribution, R&D performance...... 19  70  9  2  100

a Data on sources of funds are based on reports by the performers. This table was published in Reviews of Data on Research and Development, No. 16, “Funds for Research and Development in the United States, 1953–59,” Washington 25, D.C.: Supt. of Documents, U.S. Government Printing Office, December 1959. For full information, including a description of each sector, the reader should refer to this bulletin.

b Includes funds from the Federal Government for research centers administered by organizations in this sector under contract with Federal agencies.

c Data include State and local funds received by these institutions and used for research and development.

Note: Percentages based on unrounded figures.

Source: National Science Foundation, December 1959.
Table 7.—Transfers of R&D funds, by sector as source and as performer, 1956–57 (revised) *

(Millions of dollars)

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<thead>
<tr>
<th>Sources of R&amp;D funds, by sector</th>
<th>R&amp;D performers, by sector</th>
<th>Percent distribution, R&amp;D sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal Government agencies</td>
<td>Industry</td>
</tr>
<tr>
<td>Federal Government agencies</td>
<td>$1,280</td>
<td>$3,200</td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td>3,180</td>
</tr>
<tr>
<td>Colleges and universities *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other nonprofit institutions *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,280</td>
<td>$6,380</td>
</tr>
</tbody>
</table>

Percent distribution, R&D performance...... 15 76 7 2 100


b Includes funds from the Federal Government for research centers administered by organizations in this sector under contract with Federal agencies.

* Data include State and local funds received by these institutions and used for research and development.

Note: Percentages based on unrounded figures.
Source: National Science Foundation, December 1959.
funds in both years. As the transfer-table data indicate, a substantial and growing proportion of funds used by the industry sector in the performance of research and development came from the Federal Government. In fact, the most significant change in the distribution of total funds among the sectors as sources, from 1953-54 to 1956-57, was the growing volume of Federal funds, which amounted to 59 percent of the total for 1956-57, as compared with 53 percent for 1953-54.

On a relative basis, funds used for performance of research and development within Federal Government laboratories were less in 1956-57, than in 1953-54, as the performance by the industry sector grew. The relative position of colleges and universities and other nonprofit institutions as sources of funds was virtually unchanged. As performers, both these sectors showed slight percentage decreases.

**Basic Research Trends**

Similar information has been obtained on basic research funds. The surveys disclose that funds used in performing basic research increased from $432 million in 1953-54 to a projected $1 billion in 1959-60, an increase of 150 percent. Throughout the period, these funds were about 8 percent of estimated total R&D funds (fig. 6).

The twofold increase in funds for basic research during the five-year period, 1954-58, indicates that colleges and universities ($208 to $392 million) and industry ($151 to $272 million) showed the largest absolute increases. The other two sectors, Federal Government and other nonprofit institutions, showed the greatest increase in relative terms, a rise of more than 130 percent. (See tables 8 and 9.)

Colleges and universities stand out as the most important users of funds for the performance of basic research in both years—accounting for about half the total—and they are relatively less important as sources of funds. The totals for colleges and universities combined with other nonprofit institutions comprise more than half the national total for performance of basic research in both years.

For the Federal Government, the picture is reversed in that this sector is still the source of the largest amount of funds for basic research—half the total—but continues to be less important from the point of view of funds reported for performance.

The largest intrasectoral entry for both years, the amount retained within the industry sector for the performance of basic research, rose by almost $100 million during the period. The largest intersectoral transfer in both years is that from the Federal Government to colleges and universities, and this rose by about $120 million from 1953-54 to 1957-58. Colleges and universities comprise the only sector, from a source point of
### Table 8.—Intersectoral transfers of funds used for performance of basic research, 1953–54 (revised) *

(Millions of dollars)

<table>
<thead>
<tr>
<th>Sources of basic research funds used</th>
<th>Basic research performers</th>
<th>Percent distribution, basic research sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal Government</td>
<td>Industry</td>
</tr>
<tr>
<td>Federal Government</td>
<td>$47</td>
<td>b $19</td>
</tr>
<tr>
<td>Industry</td>
<td>132</td>
<td>11</td>
</tr>
<tr>
<td>Colleges and universities e</td>
<td>62</td>
<td>16</td>
</tr>
<tr>
<td>Other nonprofit institutions e</td>
<td>208</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>151</td>
</tr>
</tbody>
</table>

Percent distribution, basic research performance... 11  35  48  6  100

* Data on sources of funds are based on reports by the performers. This table was published in *Review of Data on Research & Development*, No. 22, "Funds for the Performance of Basic Research in the United States, 1953–58," Washington 25, D.C.: Supt. of Documents, U.S. Government Printing Office, August 1960. For full information, including a description of each sector, the reader should refer to this bulletin.

b Includes funds from the Federal Government for research centers administered by organizations in this sector under contract with Federal agencies.

e Data include State and local funds received by these institutions and used for basic research.

Source: National Science Foundation, August 1960.
Table 9.—Intersectoral transfers of funds used for performance of basic research, 1957–58 (preliminary) a

(Millions of dollars)

<table>
<thead>
<tr>
<th>Sources of basic research funds used</th>
<th>Basic research performers</th>
<th>Percent distribution, basic research sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal Government</td>
<td>Industry</td>
</tr>
<tr>
<td>Federal Government</td>
<td>$111</td>
<td>b $42</td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td>230</td>
</tr>
<tr>
<td>Colleges and universities a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other nonprofit organizations a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
<td>b 272</td>
</tr>
</tbody>
</table>

Percent distribution, basic research performance. .

|                                      | 13     | 33    | 47    | 7     | 100   |

---

a Data on sources of funds are based on reports by the performers. This table was published in Reviews of Data on Research & Development, No. 22, "Funds for the Performance of Basic Research in the United States, 1953–58," Washington 25, D.C.: Supt. of Documents, U.S. Government Printing Office, August 1960. For full information, including a description of each sector, the reader should refer to this bulletin.

b Includes funds from the Federal Government for research centers administered by organizations in this sector under contract with Federal agencies.

c Data include State and local funds received by these institutions and used for basic research.

Source: National Science Foundation, August 1960.
view, whose own funds for basic research are all used for performance within the sector.

**Instrument of Policy**

A background of comprehensive statistical data is essential to the development of science policy. Much of the factual information contained in the Foundation's policy reports has been drawn from Foundation studies. Such statistical information has been useful in the development of national science policy as well as policy relating to the operation of programs of the Foundation and of other Federal agencies. A good example concerning both types of policy development relates to the payment of indirect costs of federally sponsored research. Information developed in the 1958 survey of universities and colleges has had a strong impact on Federal policy relating to indirect costs as well as on individual agency policy.

The recently established Federal Council for Science and Technology within the Executive Office deliberates on matters of policy and program coordination and future planning among Federal agencies and makes recommendations to the President. The Foundation has served the Council in a number of its policymaking areas by conducting pertinent statistical and analytical studies.

**Impact of Research and Development**

In addition to its broad charter outlined above, the Foundation is charged with the responsibility for "appraising the impact of research upon industrial development and upon the general welfare."

Scientific research and development, recognized for its part in achieving military objectives, is now being appraised for its significance as a national activity in our economic system. This recognition was forcefully established with the Foundation's estimates for 1957 of $10 billion for research and development in the country as a whole and the employment of more than 300,000 scientists and engineers in this activity.

Extending the knowledge furnished by the fact-finding operations, the Office of Special Studies has undertaken a number of special analytical studies. These will provide better understanding of the nature and significance of the survey data. Specific examples of such projects are:

1. **Case Institute of Technology.** The project conducted by Case Institute of Technology has been directed toward producing objective and quantitative procedures for allocating funds to and within the research and development activity of a company and tracing the relation of research and development to the growth of a company. Personnel at Case Institute have worked with chemical firms on a case history approach
to develop a methodology adaptable, at least experimentally, to other industrial firms.

(2) Carnegie Institute of Technology. A study at the Carnegie Institute of Technology has sought to understand the determinants entering into the level of research and development within the economy, particularly with reference to an individual industrial firm. Linked with this objective is the further goal of gaining insight into the diffusion of innovation within the economy.

(3) Survey of Research Projects on Economic and Other Impacts of Scientific Research and Development. The survey of projects pertaining to analysis of the impact of research and development has covered colleges and universities, research institutes, professional associations, and foundations. A publication on the survey pertaining to colleges and universities was released during 1960.

(4) A Selected Annotated Bibliography on Impact of Research and Development on the Economy. A selected annotated bibliography has been published to provide references representative of typical approaches to the study of research and development and to serve as a guide for further investigation.

(5) Cost Index of Research and Development. This project, in cooperation with the Department of the Army, Office of the Director of Research and Development, involves the development of an index to deflate R&D expenditures. It may offer insight on relations of various cost elements which will assist in planning and projecting research costs in constant and current dollars. The U.S. Bureau of Labor Statistics, under contract to this Office, is now undertaking to implement the index design and it is hoped that preliminary estimates of a cost index will become available during the next fiscal year.

(6) Relation of Data on Research and Development to Overall Economic Activity. The relation of research and development expenditures to the national income and gross national product accounts is being explored in order to obtain appropriate dollar measures of the level of scientific effort compared with total economic activity. This involves separation of the elements entering into existing measures of expenditures for both research and development and gross national product from the point of view of determining which of several types of relations are meaningful and useful for studies of scientific effort and economic growth.

Conclusion

With a strong base of fundamental information about the central forces of the R&D effort, the Foundation has begun to formulate a more
specialized and analytical examination of science and technology. Activities under this broadened approach to science and technology include analyses of the magnitude and character of research and development, the education of scientists and engineers, the utilization of scientific and supporting personnel, development of scientific facilities, dissemination of scientific information, effects of technological advances, and the organization and administration of the scientific community. In addition, having dealt in the past with some of these components in laying the groundwork for overall analyses, the Foundation feels the increasing importance of viewing the totality of all scientific activities in relation to the economy. Accordingly, the Foundation plans to synthesize these elements in a broad concept of science and technology and an understanding of each of their roles.
APPENDIX A

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STERLING B. HENDRICKS, Bureau of Plant Industry, U.S. Department of Agriculture, Beltsville, Md.


CARL L. HUBBS, Scripps Institution of Oceanography, University of California, La Jolla, Calif.

C. N. H. LONG, Department of Physiology, Yale University School of Medicine, New Haven, Conn.

WILLIAM D. McELROY, Department of Biology, Johns Hopkins University, Baltimore, Md.

ERNST MAYR, Museum of Comparative Zoology, Harvard University, Cambridge, Mass.

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

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

Advisory Panel for Chemistry

A. W. ADAMSON, Department of Chemistry, University of Southern California, Los Angeles, Calif.

GILBERT AYRES, Department of Chemistry, University of Texas, Austin, Tex.

BRYCE L. CRAWFORD, Department of Chemistry, University of Minnesota, Minneapolis, Minn.

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DONALD D. DEFORD, Department of Chemistry, Northwestern University, Evanston, Ill.

FRANK T. GUCKER, Department of Chemistry, Indiana University, Bloomington, Ind.

DONALD F. HORNING, Department of Chemistry, Princeton University, Princeton, N.J.

WILLIAM JOHNSON, Department of Chemistry, University of Wisconsin, Madison, Wis.

NELSON J. LEONARD, Department of Chemistry, University of Illinois, Urbana, Ill.

O. K. RICE, Department of Chemistry, University of North Carolina, Chapel Hill, N.C.

JOHN D. ROBERTS, Department of Chemistry, California Institute of Technology, Pasadena, Calif.

HARRY H. SISLER, Department of Chemistry, University of Florida, Gainesville, Fla.
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/University</th>
</tr>
</thead>
<tbody>
<tr>
<td>GILBERT STORK</td>
<td>Department of Chemistry, Columbia University, New York, N.Y.</td>
</tr>
<tr>
<td>Advisory Panel for Course Content Improvement Section</td>
<td></td>
</tr>
<tr>
<td>LOUIS T. BENEZET</td>
<td>Colorado College, Colorado Springs, Colo.</td>
</tr>
<tr>
<td>W. A. BROWNELL</td>
<td>School of Education, University of California, Berkeley, Calif.</td>
</tr>
<tr>
<td>RALPH W. GERARD</td>
<td>Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.</td>
</tr>
<tr>
<td>CLYDE KLUCKHOHN</td>
<td>Department of Anthropology, Harvard University, Cambridge, Mass.</td>
</tr>
<tr>
<td>E. F. OSBORN</td>
<td>Pennsylvania State University, University Park, Pa.</td>
</tr>
<tr>
<td>FRANK E. MYERS</td>
<td>Argonne National Laboratory, The University of Chicago, Argonne, Ill.</td>
</tr>
<tr>
<td>DONALD TAYLOR</td>
<td>Department of Industrial Administration, Yale University, New Haven, Conn.</td>
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<tr>
<td>RAYMOND L. WILDER</td>
<td>Department of Mathematics, University of Michigan, Ann Arbor, Mich.</td>
</tr>
<tr>
<td>ARMIN C. BRAUN</td>
<td>Rockefeller Institute for Medical Research, New York, N.Y.</td>
</tr>
<tr>
<td>ALFRED J. COULOMBRE</td>
<td>Department of Anatomy, School of Medicine, Yale University, New Haven, Conn.</td>
</tr>
<tr>
<td>CLEMENT L. MARKERT</td>
<td>Department of Biology, Johns Hopkins University, Baltimore, Md.</td>
</tr>
<tr>
<td>A. C. CLEMENT</td>
<td>Department of Biology, Emory University, Atlanta, Ga.</td>
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<tr>
<td>RALPH O. ERICKSON</td>
<td>Botanical Laboratory, University of Pennsylvania, Philadelphia, Pa.</td>
</tr>
<tr>
<td>ALBERT TYLER</td>
<td>Department of Embryology, California Institute of Technology, Pasadena, Calif.</td>
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<tr>
<td>CLAUDE A. VILLEE</td>
<td>Department of Biochemistry, Harvard University, Boston, Mass.</td>
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<tr>
<td>Advisory Panel for Developmental Biology</td>
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<tr>
<td>WILLIAM B. HEROY, Sr.</td>
<td>Geotechnical Corporation, Dallas, Tex.</td>
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<tr>
<td>LEON KNOPOFF</td>
<td>Institute of Geophysics, University of California, Los Angeles, Calif.</td>
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<tr>
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<td>Scripps Institution of Oceanography, La Jolla, Calif.</td>
</tr>
<tr>
<td>FRANCIS J. PETTIFORD</td>
<td>Department of Geology, Johns Hopkins University, Baltimore, Md.</td>
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<tr>
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<tr>
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<td>Department of Geology and Geophysics, Massachusetts Institute of Technology, Cambridge, Mass.</td>
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<tr>
<td>Advisory Panel for Earth Sciences</td>
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<tr>
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<td>Department of Geology, University of Chicago, Chicago, Ill.</td>
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<tr>
<td>Advisory Panel for Economic and Sociological Sciences</td>
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<tr>
<td>HARRY ALPERT</td>
<td>University of Oregon, Eugene, Oreg.</td>
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<tr>
<td>FREDERICK F. STEPHAN</td>
<td>Department of Economics and Social Institutions, Princeton University, Princeton, N.J.</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>Social Science Research Council, New York, N.Y.</td>
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<tr>
<td>Advisory Panel for Engineering Sciences</td>
<td></td>
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<tr>
<td>R. E. BOLZ</td>
<td>Department of Mechanical Engineering, Case Institute of Technology, Cleveland, Ohio.</td>
</tr>
<tr>
<td>C. F. BONILLA</td>
<td>Puerto Rico Nuclear Center, University of Puerto Rico, College Station, Mayaguez, P.R.</td>
</tr>
<tr>
<td>CHARLES E. CUTTS</td>
<td>Department of Civil Engineering, Michigan State University, East Lansing, Mich.</td>
</tr>
<tr>
<td>EDWARD E. DAVID, Jr.</td>
<td>Bell Telephone Laboratories, Murray Hill, N.J.</td>
</tr>
<tr>
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<td>College of Engineering, University of Notre Dame, Notre Dame, Ind.</td>
</tr>
<tr>
<td>W. R. MARSHALL, Jr.</td>
<td>Engineering Experiment Station, University of Wisconsin, Madison, Wis.</td>
</tr>
<tr>
<td>OSCAR T. MARZKE</td>
<td>United States Steel Corp., Pittsburgh, Pa.</td>
</tr>
<tr>
<td>JOHN S. McNOWN</td>
<td>School of Engineering and Architecture, University of Kansas, Lawrence, Kans.</td>
</tr>
</tbody>
</table>
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Cyril S. Smith, Institute for the Study of Metals, University of Chicago, Chicago, Ill.

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LAMONT C. COLE, Department of Zoology, Cornell University, Ithaca, N.Y.

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JOHN F. REED, University of New Hampshire, Durham, N.H.


Knut Schmidt-Nielsen, Department of Zoology, Duke University, Durham, N.C.

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PAUL R. HALMOS, Department of Mathematics, University of Chicago, Chicago, Ill.

NATHAN JACOBSON, Department of Mathematics, Yale University, New Haven, Conn.

JACK C. KIEFER, Department of Mathematics, Cornell University, Ithaca, N.Y.

IVAN NIVEN, Department of Mathematics, University of Oregon, Eugene, Oreg.

HANS SAMELSON, Department of Mathematics, University of Michigan, Ann Arbor, Mich.

DONALD C. SPENCER, Department of Mathematics, Princeton University, Princeton, N.J.

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ALFRED GILMAN, Department of Pharmacology, Albert Einstein College of Medicine, Yeshiva University, New York, N.Y.

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GEORGE B. BROWN, Sloan-Kettering Institute for Cancer Research, New York, N.Y.

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

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JAMES W. COLE, Jr., School of Chemistry, University of Virginia, Charlottesville, Va.
HAROLD GOLDSTEIN, Division of Manpower and Employment Statistics, U.S. Department of Labor, Washington, D.C.
ALBERT KAY, Office of Manpower Supply, Department of Defense, Washington, D.C.
CHARLES V. KIDD, Research Planning Branch, National Institutes of Health, Bethesda, Md.
RAY W. MAYHEW, Owens-Illinois Glass Co., Toledo, Ohio.
JAMES C. O'BRIEN, Department of Health, Education and Welfare, Washington, D.C.
PHILIP N. POWERS, Department of Nuclear Engineering, Purdue University, West Lafayette, Ind.
J. FLETCHER WELLEMeyer, Washington, D.C.
DAEL WOLFLE, American Association for the Advancement of Science, Washington, D.C.

Advisory Panel for Special Projects in Science Education Section
JULIAN HILL, Committee on Fellowships and Grants, E. I. du Pont de Nemours & Co., Wilmington, Del.
MARCUS HOBS, Duke University, Durham, N.C.
JAMES JENSEN, Iowa State University, Ames, Iowa.
FREDERICK LINDVALL, Division of Engineering, California Institute of Technology, Pasadena, Calif.
WALTER F. LOEHWING, The Graduate College, State University of Iowa, Iowa City, Iowa.
ROBERT MACVICH, Graduate School, Oklahoma State University, Stillwater, Okla.
JOSEPH PLATT, Harvey Mudd College, Claremont, Calif.
F. W. SEARS, Department of Physics, Dartmouth College, Hanover, N.H.

OSWALD TIPPO, University of Colorado, Boulder, Colo.
H. GRANT VEST, Coordinating Council of Higher Education, Salt Lake City, Utah.
SAMUEL WILES, Department of Mathematics, Princeton University, Princeton, N.J.

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SIDNEY W. FOX, Oceanographic Institute, Florida State University, Tallahassee, Fla.
PAUL L. ILLO, Department of Zoology, University of Washington, St. Louis, Mo.
ROGERS MCAVAUGH, Department of Botany, University of Michigan, Ann Arbor, Mich.
HAROLD W. MANTER, Department of Zoology, University of Nebraska, Lincoln, Nebr.
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NICHOLAS C. METROPOLIS, Department of Physics, University of Chicago, Chicago, Ill.
PHILIP M. MORSE, Department of Physics, Massachusetts Institute of Technology, Cambridge, Mass.
J. BARKLEY ROSSER, Department of Mathematics, Institute for Advanced Study, Princeton, N.J.
HERBERT A. SIMON, Carnegie Institute of Technology, Pittsburgh, Pa.
CHARLES V. L. SMITH, National Aeronautics and Space Administration, Goddard Space Flight Center, Washington, D.C.
FREDERICK T. WALL, Department of Chemistry, University of Illinois, Urbana, Ill.
# APPENDIX B

Financial Report for Fiscal Year 1960

## SALARIES AND EXPENSES APPROPRIATION

### Receipts

- Appropriated for fiscal year 1960: $154,773,000
- Unobligated balance from fiscal year 1959: 4,389,001
- Total availability: $159,162,001

### Obligations

**Support of science:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>Biological and medical sciences</td>
<td>$24,413,405</td>
</tr>
<tr>
<td>Mathematical, physical, and engineering sciences</td>
<td>$30,695,143</td>
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<tr>
<td>Social sciences</td>
<td>$2,104,371</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>57,213,919</strong></td>
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**Basic research facilities:**

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<tr>
<th>Category</th>
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<tr>
<td>Development of graduate research laboratories</td>
<td>$2,153,710</td>
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<tr>
<td>Specialized biological facilities</td>
<td>$2,828,251</td>
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<tr>
<td>University computing facilities</td>
<td>$1,671,500</td>
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<tr>
<td>University nuclear research facilities</td>
<td>$2,548,958</td>
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<tr>
<td>Oceanographic research vessels</td>
<td>$3,000,000</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>12,202,419</strong></td>
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**National research facilities:**

<table>
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<th>Category</th>
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<tr>
<td>National Radio Astronomy Observatory</td>
<td>$998,400</td>
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<tr>
<td>Kitt Peak National Observatory</td>
<td>$824,000</td>
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<tr>
<td>National Center for Atmospheric Research</td>
<td>$500,000</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>2,322,400</strong></td>
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**National research programs:**

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<th>Category</th>
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<tr>
<td>Antarctic research</td>
<td>$6,179,598</td>
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<tr>
<td>Weather modification</td>
<td>$1,429,640</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>7,609,238</strong></td>
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<table>
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<tr>
<th>Category</th>
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<tbody>
<tr>
<td>Dissemination of scientific information</td>
<td>$5,370,340</td>
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<tr>
<td>Special international programs</td>
<td>$23,658</td>
</tr>
<tr>
<td><strong>Subtotal, grants and contracts</strong></td>
<td><strong>84,741,174</strong></td>
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<tr>
<td>Program development, operation, and evaluation</td>
<td>$2,136,041</td>
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<tr>
<td><strong>Total obligations—support of science</strong></td>
<td><strong>86,877,215</strong></td>
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</tbody>
</table>
Support of scientific manpower:
- Fellowships: $13,391,316
- Institutes: 33,775,040
- Research participation and scientific activities for teachers: 2,347,946
- Science education for undergraduate students: 2,871,482
- Science education for secondary school students: 4,457,736
- Public understanding of science: 316,501
- Course content improvement: 6,299,436
- Science education and technical manpower information: 891,075
- International science education: 259,697

Subtotal, grants and contracts: 64,610,229
Program development, operation, and evaluation: 2,273,466

Total obligations—support of scientific manpower: 66,883,695
Executive direction and management: 2,098,300

Total obligations, NSF: 155,859,210

Allocations to other Government agencies:
- Department of the Army: $82,685
- Department of Commerce: 2,657,640

Subtotal: 2,740,325

Total obligations, fiscal year 1960: 158,599,535
Unobligated balance carried forward to fiscal year 1961: 562,466

Total: 159,162,001

INTERNATIONAL GEOPHYSICAL YEAR APPROPRIATIONS

Receipts
- Total unobligated balance from fiscal year 1959: $1,707,589

Total availability: $1,707,589

Obligations
- Technical programs: $1,475,743
- Administrative expenses, National Academy of Sciences—National Research Council: 119,610
- Administrative expenses, National Science Foundation: 2,232

Total obligations, fiscal year 1960: 1,597,585
Unobligated balance (not available for obligation in fiscal year 1961): 110,004

Total: 1,707,589
## Trust Fund

### Receipts

<table>
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<tr>
<th>Description</th>
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<tr>
<td>Unobligated balance from fiscal year 1959</td>
<td>$6,613</td>
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<tr>
<td>Donations from private sources</td>
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<tr>
<td><strong>Total availability</strong></td>
<td><strong>8,243</strong></td>
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### Obligations

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Total obligations, fiscal year 1960</td>
<td>$894</td>
</tr>
<tr>
<td>Unobligated balance carried forward into fiscal year 1961</td>
<td>7,349</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,243</strong></td>
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</tbody>
</table>
Grants for Basic Research

ANTHROPOLOGICAL SCIENCES

AMERICAN UNIVERSITY, Washington, D.C.; Harvey C. Moore; Acculturation and Culture Change; 2 years; $12,800

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Frederick S. Hulse; Biological Characterization of Migrants; 2 years; $19,200

Marvin A. Stokes, Geochronology Laboratories; Late Prehistory of Northern Arizona; 1 year; $3,500

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Walter Goldschmidt; Los Angeles; Cultural Concomitants of Ecological Change; 2 years; $30,800

Robert F. Heizer; Culture History of the Western Great Basin; 1 year; $4,500

John T. HucStop, Los Angeles; Study of Nepalese Tribe; 18 months; $22,800

Rene F. Million; Urbanization of Teotihuacan; 2 years; $9,800

D. L. Olmsted, Davis; Prehistory of Northern California; 2 years; $13,000

John H. Rowe; Interpretations of Peruvian Archaeology; 1 year; $9,000

CARLETON COLLEGE, Northfield, Minn.; Frank C. Miller; Acculturation Among the Chipewyas; 1 year; $4,300

CATHOLIC UNIVERSITY OF AMERICA, Washington, D.C.; Svend Frederiksen; Collection of Eskimo Tests; 1 year; $12,800

CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Paul S. Martin; Archaeology of the Upper Little Colorado; 1 year; $8,500

UNIVERSITY OF CHICAGO, Chicago, Ill.; Alan H. Jacobs; Culture Change in the Missouri; 1 year; $7,700

Arthur J. Jelinek; Prehistoric Change in New Mexico; 1 year; $5,800

Norman A. McQuown; Change and Continuity in Chippewa; 2 years; $25,000

Manhing Nash; Social Change in a Rural Society; 1 year; $7,800

COLUMBIA UNIVERSITY, New York, N.Y.; Ralph S. Solecki; Prehistoric Man in Shattar Valley, Northern Iraq; 1 year; $23,500

William Duncan Strong; Analysis of Excavation in Peru; 1 year; $2,300

CONNECTICUT COLLEGE, New London, Conn.; Charles P. Hockett; Field Study of the Fijian Language; 2 years; $22,300

Allan R. Holmberg; Prehistoric Human Ecology in Peru; 1 year; $20,000

DARTMOUTH COLLEGE, Hanover, N.H.; Gordon M. Day; Study of the Abenaki Dialects; 1 year; $10,000

HARTFORD SEMINARY FOUNDATION, Hartford, Conn.; Henry A. Gleason, Jr.; Statistical Methods in Linguistic Reconstruction; 1 year; $6,400

HARVARD UNIVERSITY, Cambridge, Mass.; Hallan L. Movius, Jr.; Upper Palaeolithic Cultures in the Dordogne; 2 years; $35,000

Evan Z. Vogt; Study of Linguistic Images; 1 year; $8,000

HUMAN RELATIONS AREA FILES, New Haven, Conn.; George P. Murdock; Atlas of Eurasian Cultures; 1 year; $23,800

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Frederick K. Lehmam; Ethnographic Research in Chin Hills; 1 year; $3,800

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Thomas A. Sebeok; Prehistory in Psychology; 1 year; $15,300

LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE, London, England; Raymond Firth; Comparative Study of Extra-Familial Kinship; 1 year; $22,300

LOS ANGELES STATE COLLEGE FOUNDATION, Los Angeles, Calif.; Robert H. Ewald and Louis C. Farson; Ethnicographic Survey in Eastern Panama; 1 year; $6,000

LOUISIANA STATE UNIVERSITY, Baton Rouge, La.; William G. Haag; Archaeological Research in the Caribbean; 1 year; $13,000

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; James B. Griffin; Prehistoric Occupations of the Great Lakes Area; 1 year; $27,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Eldon Johnson; Archaeology of Glacial Lake Agassiz Basin; 1 year; $18,200

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Frank C. Hibben; Recovery of Prehispanic Paintings; 1 year; $12,500

NORTHWESTERN UNIVERSITY, Evanston, Ill.; W. Creighton Gabel; Ecological Adaptations in the Later Stone Age; 2 years; $21,500

UNIVERSITY OF OREGON, Eugene, Ore.; Luther S. Cressman; Mandan Culture History; 1 year; $2,500

Luther S. Cressman; Research on Northwest Prehistory; 2 years; $21,700

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Alfred Kidder, II; Archaeology of Tikal; 1 year; $23,000

Fredric Ralney; Research on Archaeological Techniques; 1 year; $27,900

Ruben E. Reina; Community Study in Peten; 15 months; $20,000

SAN FERNANDO VALLEY STATE COLLEGE, Northridge, Calif.; Ronald Rollins; Index of Social Development; 1 year; $8,000

SMITHSONIAN INSTITUTION, Washington, D.C.; Clifford Evans; Obsidian Dating; 2 years; $21,900

Gordon D. Gibson; Economic System of the Herero; 1 year; $10,000

TEXAS TECHNOLOGICAL COLLEGE, Lubbock, Tex.; Francis E. Green; Prehistoric Studies of Lubbock Reservoir; 1 year; $6,000
Astronomy

Amherst College, Amherst, Mass.; Albert P. Llinell and Robert H. Koch; Kinematic Binaries; 1 year; $7,500

Association of Universities for Research in Astronomy, Inc. (AURA), Tucson, Ariz.; Aden B. Melncl, Kitt Peak National Observatory; Preliminary Conceptual Design and Experimental Studies for Large Orbital Telescopes; 2 years; $250,000

Brigham Young University, Provo, Utah; D. H. McNamara; A Spectrographic Study of Beta Canis Majoris Stars; 2 years; $15,500

University of California, Berkeley, Calif.; George H. Herbig, Lick Observatory, Mount Hamilton; Design and Construction of High-Dispersion Nebular Spectrograph; 18 months; $80,300

Gold E. Kron; Photometric Investigations in the Mount Stromlo Observatory, Canberra, Australia; 1 year; $1,800

Jerry Neyman; Statistical Studies of Double and Multiple Galaxies; 1 year; $12,100

Merle F. Walker; Operation of the Lallemand-Type Image Converter; 2 years; $4,500

George Wallerstein; Abundances of the Elements in High Velocity G Dwarf Stars; 2 years; $8,800

A. E. Whittford; Application of a Pressure-Scanning Fabry-Perot Interferometer to High Resolution Stellar Spectroscopy; 18 months; $17,500

A. E. Whittford, Lick Observatory; 4½-Inch Photometric Telescope; 2 years; $20,000

Carnegie Institution of Washington, Washington, D.C.; Merle A. Tuve; Development of Image Tubes for Telescopes; 2 years; $130,000

Merle A. Tuve; Radio Astronomy H-Line Installation in South America; 1 year; $41,000

University of Chicago, Chicago, Ill.; Geoffrey Burbidge and Margaret Burbidge, Yerkes Observatory; Photometric and Spectroscopic Studies of the Structure and Dynamics of External Galaxies; 2 years; $48,900

G. Van Biesbroeck; Astrometric Investigations; 1 year; $3,200

Gerard P. Kuiper; Development of Two Interferometer Telescopes; 1 year; $6,000

Richard H. Miller; Equipment for Selected Photometric Observations; 1 year; $8,800

William W. Morgan, Yerkes Observatory; Studies in Stellar Classification; 4 years; $35,700

William C. Erickson, San Diego, Calif.; A Design Study on Very Large Arrays for Radio Astronomy; 3 months; $1,000

University of Florida, Gainesville, Fla.; Alex G. Smith; Measurement and Analysis of Planetary Emissions at Radio Frequencies; 2 years; $25,500

Georgetown University, Washington, D.C.; Vera C. Rubin; Photometric Reduction of Standardized Photographs of Galaxies; 2 years; $7,200

Harvard University, Cambridge, Mass.; David Layzer; Theoretical Energy Levels and Transition Probabilities; 1 year; $17,500

William Liller; Evolutionary Effects on the Continuous Spectra of Stars; 1 year; $2,700

Martha H. Liller; Intensity Distribution in Galaxies in the Virgo Cluster; 1 year; $4,300

A. Edward Lilley; Hydrogen-Line Radio Astronomy; 6 months; $120,600

High Altitude Observatory of the University of Colorado, Boulder, Colo.; Walter Orr Roberts; Equipment for New Graduate Program in Astrophysics; 1 year; $9,000

University of Illinois, Urbana, Ill.; Ivan R. King; Dynamics of Star Clusters; 1 year; $4,000

A. J. Meadows; The Rotational Velocities of Early Type Stars in Galactic Clusters; 1 year; $2,770

Indiana University Foundation, Bloomington, Ind.; James Cuffey; Light Curves, Color Curves, Periods and Changes in Periods of Short Period Variable Stars in the Globular Cluster Messier 4; 1 year; $5,800

John B. Irwin; Analysis of Photoelectric Observations of Cepheids; 1 year; $6,900

Institute for Advanced Study, Princeton, N.J.; Bengt Stromgren; Investigations of Age, Space Velocity, and Chemical Composition for Stars Brighter Than 7 magnitudes on the Basis of Photoelectric Narrow-Band Photometry; 2 years; $19,800

University of Kansas, Lawrence, Kans.; Henry G. Horak; Computations in Radiative Transfer and Theoretical Photometry; 1 year; $9,600

Louisiana State University, Pierre R. Demarque; The Influence of Chemical Composition on Stellar Evolution; 2 years; $17,300

Lowell Observatory, Flagstaff, Ariz.; Henry L. Glass; Proper Motion Survey of the Northern Hemisphere with the 13-Inch Photographic Telescope; 3 years; $41,000

John S. Hall; Transfer of the Perkins Reflector to Flagstaff, Ariz.; 1 year; $231,300

Maria Mitchell Observatory, Nantucket, Mass.; Dorrit Hoffert; Research on Variable Stars, Especially in Sagittarius; 2 years; $10,800

University of Massachusetts, Amherst, Mass.; Robert Howard; The Reduction of Observation of Magnetic Fields and Motions on the Surface of the Sun; 2 years; $8,600

Massachusetts Institute of Technology, Cambridge, Mass.; Jerome B. Wiesner; Detection of the Galactic Deuterium Line; 19 months; $90,000

University of Michigan, Ann Arbor, Mich.; Orren C. Mohler; Associations Between Terrestrial Magnetic Storms and Solar Activity; 1 year; $8,000
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<th>Institution</th>
<th>Project Description</th>
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<tr>
<td>VASSAR COLLEGE, Poughkeepsie, N.Y.</td>
<td>Henry J. Smith: Planetary Nonthermal Dynamics</td>
<td>3 years</td>
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<td>OHIO STATE UNIVERSITY, Columbus, Ohio</td>
<td>William Blitzstein and Frank B. Woos: Astronomical Research in the Infrared</td>
<td>3 years</td>
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<td>PRINCETON UNIVERSITY, Princeton, N.J.</td>
<td>Martin Schwarzschild: High Altitude Astronomy</td>
<td>2 years</td>
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<td>RENSSELAER POLYTECHNIC INSTITUTE, Troy, N.Y.</td>
<td>A. W. Stralton: A Radio Telescope for Millimeter Wavelengths</td>
<td>1 year</td>
<td>$29,900</td>
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<td>University of Wisconsin, Madison, Wis.</td>
<td>Julian E. Mack: Spectrum Line Shapes in the Solar Corona</td>
<td>2 years</td>
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<td>Yale University, New Haven, Conn.</td>
<td>Harlan J. Smith: Planetary Nonthermal Radio Emission</td>
<td>2 years</td>
<td>$33,500</td>
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<td>OHIO UNIVERSITY, Athens, Ohio</td>
<td>Ronald N. Bracewell: Solar Radio Emission</td>
<td>18 months</td>
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<td>YALE UNIVERSITY, New Haven, Conn.</td>
<td>Sherman C. Lowell: Atmospheric Applications of Theoretical Fluid Mechanics</td>
<td>3 years</td>
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<td>AMERICAN METEOROLOGICAL SOCIETY, Boston, Mass.</td>
<td>Ralph B. Bascom: Cumulative and Current Bibliography on Weather Modification and Cloud Physics</td>
<td>3 years</td>
<td>$40,800</td>
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<td>UNIVERSITY OF CALIFORNIA, Berkeley, Calif.</td>
<td>Jacob Bjerken: Sea Surface Temperature and Atmospheric Circulation</td>
<td>3 years</td>
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<td>COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.</td>
<td>Richard A. Schlesener: Hall Suppression Evaluation</td>
<td>1 year</td>
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<td>University of North Carolina, Chapel Hill</td>
<td>Richard A. Schlesener: Study of the Characteristics and Formation of Hall Over the Western Great Plains</td>
<td>2 years</td>
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<td>COLUMBIA UNIVERSITY, New York, N.Y.</td>
<td>Horace E. Byers and Roscoe R. Graham: Physical Effects of Silver Iodide Seeding in the Great Plains</td>
<td>3 years</td>
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<td>NASA</td>
<td>Dave Fultz: Meteorological Experimental Hydrometeorology</td>
<td>3 years</td>
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<td>GEORGE W. PLATZMAN: Numerical-Dynamical studies of the Atmospheric General Circulation</td>
<td>3 years</td>
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<td>UNIVERSITY OF ILLINOIS, Urbana, Ill.</td>
<td>Glenn L. Lohmann, Gordon MacDonald, Walter Munk, and Clarence Palmer: Theoretical and Experimental Atmospheric Sciences</td>
<td>3 years</td>
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<td>UNIVERSITY OF MINNESOTA, Minneapolis, Minn.</td>
<td>Walter H. Munk and Frank E. Snodgrass: Scripps Institution of Oceanography, La Jolla; Oceanic and Atmospheric Tides</td>
<td>3 years</td>
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<td>University of Chicago, Chicago, Ill.</td>
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<td>UNIVERSITY OF COLORADO, Boulder, Colo.</td>
<td>Walter Orr Roberts: Interdisciplinary Studies in Solar-Upper Atmosphere Relationships</td>
<td>3 years</td>
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<td>UNIVERSITY OF ILLINOIS, Urbana, Ill.</td>
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<td>Massachusetts Institute of Technology, Cambridge, Mass.; Lewis D. Kaplan;</td>
<td>Infrared Flux in the Earth's Atmosphere; 3 years;</td>
<td>$139,600</td>
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<td>University of Michigan, Ann Arbor, Mich.; Wendell Hewson and Gerald C. Gill; Atmospheric Diffusion in Transitional States; 3 years;</td>
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<td>National Academy of Sciences, Washington, D.C.; G. D. Maid; Support of IUC Activities; 1 year;</td>
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<td>F. W. Brown; World Data Center for Airflow and Icograms; 1 year;</td>
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<td>New Mexico Institute of Mining and Technology, Socorro, N. Mex.; Marvin H. Wilkening; Baden and Its Decay Products in the Lower Atmosphere; 3 years;</td>
<td>$56,100</td>
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<td>New York University, New York, N.Y.; Gerhard Neumann; Measurements of the Rayleigh Stress and Wind Stress-Wind Relationships Over the Sea Surface; 2 years;</td>
<td>$50,500</td>
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<td>Office of Naval Research, Washington, D.C.; B. Vonnegut, Arthur D. Little, Inc.; Cloud Electrodynamics; 1 year;</td>
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<td>B. Vonnegut and C. B. Moore; Cloud Electrodynamics Studies; 1 year;</td>
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<td>Oregon State College, Corvallis, Ore.; F. W. Decker; Observation of Halffalls and Related Atmospheric Phenomena in Southern California; 2 years;</td>
<td>$30,400</td>
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<td>Pennsylvania State University, University Park, Pa.; H. D. Rix; Study of Photoattachment Cross Sections for Negative Halogen Ions; 2 years;</td>
<td>$39,800</td>
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<td>Texas Agricultural and Mechanical Research Foundation, College Station, Tex.; Donald W. Hood; Sea-Air Interface Carbon Dioxide Exchange Phenomena; 2 years;</td>
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<td>Vance Moyer; Radar Investigation of Sublimation Precipitation; 3 years;</td>
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<td>University of Texas, Austin, Tex.; Charles W. Tolbert; Microwave Radiating and Reflecting Properties of Precipitation; 3 years;</td>
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<td>Tufts University, Medford, Mass.; Irving Schell; Ocean Ice-Sea Temperature-Weather Interrelations; 3 years;</td>
<td>$50,700</td>
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<td>U.S. Department of Agriculture—Forest Service, Ogden, Utah; D. M. Fugnay; Investigation of Cloud Modification Techniques to the Problem of Lightning-Caused Forest Fire; 30 months;</td>
<td>$63,900</td>
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<td>U.S. Weather Bureau, Washington, D.C.; F. W. Retchelderfer; Specialized Upper Air Observations for the Santa Barbara Cloud Study Project; 1 year;</td>
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<td>Helmut Landeberg; World Data Center A for Meteorology and Nuclear Radiation; 1 year;</td>
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<td>F. W. Retlchelderfer; Specialized Upper Air Observations at Santa Monica, Calif.; 1 year;</td>
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<td>University of Vermont and State Agricultural College, Burlington, Vt.; Richard J. Howard, Molecular Association in Super-Saturated Vapors; 3 years;</td>
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<td>University of Washington, Seattle, Wash.; Robert G. Fleagle; Wind, Temperature and Humidity Profiles at Sea; 2 years;</td>
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<td>Chemistry</td>
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<td>Agnes Scott College, Decatur, Ga.; W. Joe Frierson; Paper Chromatographic Separation, Spectrophotometric Determination and New Reagents for Determination of Traces of Metallic Ions; 3 years;</td>
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<td>Albion College, Albion, Mich.; Paul L. Cook; Hydrogenations With Nickel-Aluminum Alloy in Aqueous Alkaline Solution; 3 years;</td>
<td>$1,700</td>
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<td>Alfred University, Alfred, N.Y.; Clifford E. Myers; Vaporization Properties of Phosphides; 2 years;</td>
<td>$13,300</td>
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<td>Arizona State University, Tempe, Ariz.; Roland K. Robinson; Physical and Chemical Properties and Molecular Structure of Certain Purines and Purine Analogues; 3 years;</td>
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<td>University of Arizona, Tucson, Ariz.; Henry Freiher; Application of Gas-Liquid Chromatography to Inorganic Separation Processes; 3 years;</td>
<td>$53,500</td>
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<td>University of Arkansas, Fayetteville, Ark.; Samuel Siegel; Stereochemistry of the Catalytic Hydrogenation of Aromatic and Hydroaromatic Compounds; 3 years;</td>
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<td>Kurt H. Stern; Interactions in Solution; 2 years;</td>
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<td>Boston University, Boston, Mass.; Norman N. Lichtin; Chemical Kinetics, Activities and Ionization and Dissociation Equilibria of Electrolytes in Nonaqueous Media; 3 years;</td>
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<td>Ronald M. Milburn; Redox Reactions of Ligands; 2 years;</td>
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<td>Bowdoin College, Brunswick, Maine; John E. Frey; Solvent Properties of Compounds of Group IIIIB Elements; 2 years;</td>
<td>$16,000</td>
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<td>Brown University, Providence, R.I.; Robert H. Cole; Dielectric Properties of Inert Gases; 18 months;</td>
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<td>Robert L. Kay; Measurement of Transferrence Numbers in Solvents of Low Dielectric Constant; 2 years;</td>
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<td>University of Buffalo, Buffalo, N.Y.; Walter Dannhusser; Electrical Conductivity in Polymeric Systems; 1 year;</td>
<td>$5,600</td>
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<td>Henry M. Woodburn; Reaction of Tetrafluoroacetamide With Hydrogen-Containing Functional Groups; 2 years;</td>
<td>$12,000</td>
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<td>California Institute of Technology, Pasadena, Calif.; G. W. Robinson; Low Temperature Chemistry; 3 years;</td>
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<td>Ernest H. Swift; Mechanisms of the Reactions Between Thioacetamide and Various Metals; 3 years;</td>
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<td>University of California, Berkeley, Calif.; Lawrence J. Andrews and Raymond M. Keefer; Solvent Effects in Polar Reactions of Organic Substances With Halogens; 3 years;</td>
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<td>Kenneth Conrow; Chemistry of Substituted Alkyl Trichlorides; 2 years;</td>
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<td>Donald J. Cram; Los Angeles; Chemistry of Organometallic Compounds; 3 years;</td>
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<td>W. F. Glauke; Thermodynamic and Magnetic Properties at Low Temperatures; 1 year;</td>
<td>$116,500</td>
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<td>Eugene R. Hardwick; Los Angeles; Scintillation Study of Radiation Damage in Crystalline Solids; 3 years;</td>
<td>$18,700</td>
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<td>James F. Horning; Energy Transfer in Molecular Solids; 2 years;</td>
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Frederick R. Jensen; Biochemistry; 3 years; $54,100

Harry W. Johnson, Jr., Riverside; Rearrangement of 2-Bromosuccinimide to Beta-Bromopropionyl Isocyanate; 2 years; $10,000

James D. McAligher; Nuclear Reactions and Equilibrium Studies of Group VIB Compounds; 2 years; $20,000

Donald S. Noyce; Organic Reaction Mechanisms; 3 years; $54,800

Carl L. Pecor, Los Angeles; Complexes of Chromium (II); 2 years; $10,200

Andrew Streitwieser, Jr.; Theoretical Organic Chemistry; 3 years; $54,100

Calvin College, Grand Rapids, Mich.; Roger J. Faber; Electron Spin Resonance Study of Certain Metal Radicals in Solution; 3 years; $11,500

Carleton College, Northfield, Minn.; Helen G. Greer; Characterization of Phenyl-Substituted Hydroxydiphenyl-Triazines; 2 years; $8,200

Carnegie Institute of Technology, Pittsburgh, Pa.; Robert B. Carlin; 4, 6-Disubstituted Phenylhydrzones in the Fischer Indole Synthesis; 42 months; $50,300

Robert R. Holmes; Pentacoordinated Molecules; 2 years; $12,600

Robert J. Kurland; Chemical Studies in Nuclear Magnetic Resonance and Electron Paramagnetic Resonance; 3 years; $25,700

Robert G. Parr and Frank O. Ellison; Theoretical Studies of the Electronic Structure of Molecules; 3 years; $50,700

Frederick D. Rossini; Thermochromism; 2 years; $22,800

Phillip L. Southwick; Stereochemistry of Conjugate Addition; 2 years; $18,800

Case Institute of Technology, Cleveland, Ohio; Marvin F. Astle; Catalysis of Organic Reactions With Ion Exchange Resins; 2 years; $17,000

Peter Kovac; Reaction of Metal Halides With Organic Compounds; 2 years; $28,600

F. E. Pierce; Brownian Motion Theory for Interacting Particles; 2 years; $17,500

Donald R. Whitman; Analysis of Nuclear Magnetic Resonance Spectra; 2 years; $20,900

Catholic University of America, Washington, D.C.; B. Dell. Derwent; The Lifetime and Vibrationally Excited Species; 3 years; $36,800

Central State College, Wilberforce, Ohio; E. O. Woolfolk, Reagents for Identification and Chromatographic Separation of Colorless Organic Compounds; 3 years; $10,800

University of Chicago, Chicago, Ill.; Robert A. Clement; Solvation Effects in Organic Reactions; 30 months; $24,800

University of Cincinnati, Cincinnati, Ohio; Frank R. Neese; Critical Phenomena in Binary Systems; 2 years; $11,700

Milton Orchin; Mechanism of Selenium-Catalyzed Dehydrogenations; 2 years; $1,100

Clark University, Worcester, Mass.; Arthur E. Martell, Metal Chelate-Catalyzed Hydrolysis of Phosphate and Related Compounds; 3 years; $22,800

Edward N. Trachtenberg; Mechanism of Nucleophilic Displacement in Betahaloketones, Mannich Bases and Related Compounds; 2 years; $12,400

Colorado School of Mines, Golden, Colo.; J. L. Hall; Acetonitrile as a Solvent for Inorganic Reactions; 2 years; $19,800

Colorado State University Research Foundation, Fort Collins, Colo.; John B. Rogen; Variables Influencing the Participation of an Olefinic Bond During Solvolysis; 14 months; $8,800

University of Colorado, Boulder, Colo.; John R. Lerner and Joseph D. Park; Vapor Phase Calorimetry; 5 years; $55,800

Henry J. Richter; Chemistry of Pyracene; 2 years; $11,000

University of Connecticut, Storrs, Conn.; Roy J. Gittert; Free Radical Chemistry of the Organic Ligands in Coordination Compounds; 3 years; $15,500

William L. Masterton and Emil J. Slowinski; Effect of Pressurizing Gases on Surface Tension of Liquids; 1 year; $9,000

Car L. Meoeller; Photochemical Reactions of 3, 4-Disubstituted Metal Coordination Compounds; 3 years; $20,000

John T. Stock; Voltammetric Behavior of Suspended Solids; 2 years; $7,500

Roland Ward; Chemistry of Solids; 2 years; $38,900

Cornell University, Ithaca, N.Y.; S. H. Bauer and Richard F. Porter; Determination of the Molecular Structures of Metal Oxide and Metal Halide Species in the Vapor Phase at Temperatures of 500° to 2000° C.; 18 months; $20,000

Donald S. Noyce; Investigation of Polymer Interaction by Critical Opalescence; 1 year; $13,500

Albert L. Labenbanger; Synthesis and Characterization of Inorganic Polymers; 3 years; $31,700

Charles F. Wilcox, Jr.; The Nitrogenium Ion; 2 years; $15,300

Davis and Elkins College, Elkins, W. Va.; Louis E. Mattison; Preparation and Properties of Bimetallic Polymeric Chelate Compounds; 2 years; $15,400

Edward H. Beres, Richmond, Ind.; Wilmer J. Stratton; Investigations of Unusual Metal Chelate Compounds With Azine Ligands; 2 years; $9,100

Emory University, Atlanta, Ga.; J. H. Goldstein; Small Computer Installation for Chemical Research; 1 year; $29,700

Arthur L. Underwood, Jr.; Photometric Titrations; 2 years; $13,500

University of Florida, Gainesville, Fla.; George B. Butler; Stereochromic Studies of Polymers Obtained by Alternating Intra- molecular-Intermolecular Propagation; 3 years; $38,600

William M. Jones; Kinetics and Stereochromic of the Decomposition of Pyrazoles; 2 years; $21,500

Fred W. Stoughton, Smith Hall College, Lancaster, Pa.; Fred A. Snively and Fred H. Suydam; Structure and Properties of Azopyrazoline Dyes and Their Metal Derivatives; 2 years; $9,400

Fresno State College Foundation, Fresno, Calif.; George B. Kaufman; Separation of Inorganic Cis From Trans Isomers by Chromatographic Adsorption; 2 years; $5,900
Harvey Dohl: Analytical Applications of Heterocyclic Compounds Related to 1,10-
Phenanthrene; 3 years; $45,000

Klaus Ruedenberg: Theoretical Work on the Electronic Structure of Molecules; 2 years;
$51,600

Johns Hopkins University, Baltimore, Md.; Paul H. Emmett: Catalytic Hydroge-
nation Over Metals; 2 years; $21,200

Dean W. Robinson: Spectral Studies of Solids and Trapped Gases in the 2 - 40 Micron
Region; 3 years; $42,000

Emil H. White: Oxidation Reactions of Aromatic Amines; 3 years; $44,200

University of Kansas, Lawrence, Kans.; William J. Argersinger, Jr.; Isopolaric
Studies in Aqueous Mixed Electrolyte Solutions; 3 years; $27,500

University of Kansas City, Kansas City, Mo.; James Moffat; Chemistry of Organic
Isoxazoles and Related Compounds; 3 years; $13,000

Lehigh University, Bethlehem, Pa.; Albert C. Zettlemoyer; Wetting of Solids by Li-
quids; 3 years; $39,300

Louisiana State University, Baton Rouge, La.; Donald G. Davis; Analytical Application
of Chronopotentiometry With Solid Electrodes; 3 years; $13,500

Paul Delahay; Structure of the Double Layer and Correlation With Electrode Pro-
cesses; 3 years; $64,400

University of Louisville, Louisville, Ky.; Richard H. Wiley; Heterocyclic and Stereo-
chemistry; 3 years; $19,100

LoYola University, Chicago, Ill.; Carl E. Moore; Precipitation Processes at High
Temperatures and Pressures; 2 years; $8,600

Luther College, Decorah, Iowa; Adrian Docken; Synthesis of Cyclopentanone-
tene Derivatives; 1 year; $5,200

Marquette University, Milwaukee, Wisc.; Norman E. Hoffman; Catalytic Decarbonyla-
tion of Aldehydes; 2 years; $17,500

Walter Strick: Polarographic Studies With the Rotated Dropping Mercury Elec-
trode; 2 years; $14,000

University of Maryland, College Park, Md.; Ellis R. Lippincott; Spectroscopic and Struc-
tural Studies of Disolod Salts; 3 years; $22,400

Yoinda T. Pratt; The Chemistry of the 5,8-Quinolinoquinones; 2 years; $13,100

Ernest F. Pratt; Selectivated Reactants in Organic Chemistry; 2 years; $17,500

Homer W. Schamp, Jr., and Edward A. Mason; Pressure-Volume-Temperature Rela-
tionships of Gases; 3 years; $37,300

Massachusetts Institute of Technology, Cambridge, Mass.; Frederick D. Greene,
Decomposition of Organic Hypochlorites; 3 years; $27,700

Herbert O. House; Synthesis of Gibberellic Acid; 3 years; $23,800

University of Michigan, Ann Arbor, Mich.; Gordon Atkinson; Antisomatry of Inorganic
Polymers; 2 years; $20,500

C. E. Nordman, Robert W. Parry and R. C. Taylor; The Bridge and Coordinate Bond in
Inorganic Systems; 2 years; $134,200

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University of Minnesota, Minneapolis, Minn.; Bryce L. Crawford; Intensity Studies in Infrared Spectra of Crystals; 3 years;
$62,100

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Ernest B. Sandell; Determination of Zinc and Cadmium in Meteorites; 2 years; 
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Lloyd H. Reynolds; Magnetic Susceptibility Studies of Adsorbed Gases; 2 years; 
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Northeast Louisiana State College, Monroe, La.; Raymond Amnlo; Polarographic 
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Selwood; Structure and Activity of Catalytic Solids; 2 years; $17,100

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cules; 3 years; $37,000

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gen Bonding Involving Double and Triple Bonds, Aromatic Compounds and Small 
Rings as Proton Acceptors; 2 years; $21,500

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pounds, Germanium and Tin; 3 years; $38,800

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escence Phenomena; 3 years; $26,100

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James W. Cobble, Thermodynamic Properties of High Temperature Solutions; 3 
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Acetylenic, Olefinic and Vinyl Halide Systems; 3 years; $27,400

Quartermaster Research and Engineering Command, U.S. Army, Lackl, Mass.; Louis 
Long, Jr.; Relative Reactivity of the Hydroxyl Groups of Sucrose and Its Sulfonyl 
Derivatives; 1 year; $14,700

University of Redlands, Redlands, Calif.; John L. Abernethy; The Solution of Partial 
Asymmetric Synthesis in Enzyme-Catalyzed Reactions Between Amido Acids and Other 
Basic Compounds; 1 year; $2,400

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Rearrangements in the Cyclopropyl-l-l- 
Ethylic Compounds; 2 years; $13,300

George J. Janz; Raman Spectra of Molten Salts; 2 years; $28,100

Robert L. Strong, Complex Formation in the Flash Photolysis and Recombination of 
Halogens in Aromatic Solvents; 3 years; $29,400

Research Foundation of State University of New York, Albany, N.Y.; Robert T. La 
Louche, Chemistry of Forestry at Syracuse: Chemistry of Bridged Polycyclic Olefins; 
2 years; $7,000

Bruce McDuffie, Linear Voltage-Scan Voltammetry with Stationary Mercury Drop 
Electrode; 2 years; $32,200

W. Prins; College of Forestry at Syracuse; Crystallinity & Superstructure of Polymer Films by Means of Light-Scattering; 
3 years; $14,900

Fausto Ramirez; Mechanisms of Reactions of Polymeric Compounds; 2 years; $24,000

Rice Institute, Houston, Tex.; Richard B. Turner, Heats of Catalytic Hydrogenation 
in Solution; 2 years; $24,100
UNIVERSITY OF ROCHESTER, Rochester, N.Y.;
A. B. F. Duncan; Electronic Structure of
Some Polyatomic Molecules; 3 years;
$24,100

Marshall Gates, Studies of Gelseminine; 3
years; $25,000

W. Scott Noyes, Photoysis of 3-Hexa-
none-5,5,5,4; 2 years; $28,500

D. Stanley Tarbell, Reactions of Mixed
Carboxyl-Carbonic Anhydrides and Related
Compounds; 3 years; $39,400

Don W. Wilson; Proton Magnetic Resonance
Study of Molecular Processes; 2 years;
$10,500

ROOSEVELT UNIVERSITY, Chicago, Ill.; Eugene
Lieber; Elucidation of the Oxidation of
Aminequinuoline in Basic Media; 2 years;
$11,500

RUTGERS, THE STATE UNIVERSITY, New
Brunswick, N.J.; Roderick A. Barnes; Molecu-
lar Orbital Calculations for Solving Some
Problems in Organic Chemistry; 3 years;
$19,000

SAN DIEGO STATE COLLEGE FOUNDATION, San
Diego, Calif.; John C. Sheppard; Kinetics
of the Cobalt (III)-Iron (II) and the Cob-
alt (III)-Chromium (II) Reactions in
Perchloric Acid; 2 years; $13,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los
Angeles, Calif.; Jerome A. Berenson; Wagner-
Meerwein Rearrangements; 3 years;
$35,000

David A. Down; Vibrational Spectra of
Carbon Compounds; 3 years; $23,700

SOUTHERN ILLINOIS UNIVERSITY, Carbondale,
Ill.; Robert E. Van Atta and Douglas E.
Sellers, Electrochemical and Spectropho-
tomeric Investigation of Various Imines; 2
years; $27,000

Roger E. Boyer; Reactions of Grignard
Reagents with Sterol Epoxydies; 2 years;
$16,500

STANFORD UNIVERSITY, Stanford, Calif.;
William A. Bonner, Mechanisms of Raney
Nickel Catalyzed Hydrogenolytic Processes;
3 years; $26,000

Richard H. Eastman, Oxidation Reactions of
Terpenes and Related Compounds; 2 years;
$27,000

E. J. Eisenbraun; Absolute Configuration of
Sesquiterpenes; 2 years; $19,600

Frank E. Harris; Quantum Mechanical
Studies of Small Ions and Molecules; 2
years; $20,300

STATE COLLEGE OF WASHINGTON, Pullman,
Wash.; Donald S. Matteson; Unsaturated
Boron Acids; 2 years; $13,000

STATE UNIVERSITY OF IOWA, Iowa City, Iowa;
Alexander I. Popov; Physicochemical Study of Halogen Charge-Transfer Com-
plexes; 2 years; $15,100

R. T. Sanderson; Chemistry of Calcium,
Strontium, and Barium; Compounds Con-
taining Carbon Metal Bonds; 2 years;
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John K. Stille; Reactions of Tetracyclic
Diene and an Approach to the Synthesis of
Pentalene; 3 years; $24,200

Stanley Wawzonek; Preparation and
Properties of Aminimides; 2 years; $19,800

STEVENS INSTITUTE OF TECHNOLOGY, Hobo-
knock, N.J.; Alex K. Bone; Optical Rotatory
Dispersion of Natural Products; 2 years;
$24,100

SYRACUSE UNIVERSITY RESEARCH FOUNDATION,
Syracuse, N.Y.; Thomas H. Walnut;
Infrared Spectrum of Solid Sulfur (100 to
700°) and Temperature Dependence of
Infrared Spectrum of Ice; 2 years;
$15,700

TEMPLE UNIVERSITY, Philadelphia, Pa.;
Francis H. Case; Heterocyclic Nitrogen
Compounds Capable of Forming Chelates
with Metals; 3 years; $16,800

UNIVERSITY OF TEXAS, Austin, Tex.; Richard
Fuchs; Factors Determining the Hammett
Eho Constant in Biomolecular, Nucleophilic
Displacement Reactions; 3 years; $17,900

THIEL COLLEGE, Greenville, Pa.; Walter H.
Poterbaugh; Importance of the Metallic
Cation in Certain Organic Reactions Effected
by Strong Alkali Bases; 2 years; $5,500

TULANE UNIVERSITY, New Orleans, La.; Joseph H. Boyer; The Reaction
of Nitrogen Oxides and of O-Nitroso Com-
 pounds With Unsaturated Groups; 3 years;
$23,300

Hans B. Jonassen; Theoretical Treatment
Relating High-Frequency Paramagnetism to
the Color of Molecules in 'E States; 1 year;
$5,500

URBAN STATE COLLEGE, Collegeville, Pa.; Roger
P. Stalger; Isotopic Anhydride: An Analytical
Reagent for Characterization of Organic
Compounds; 3 years; $23,300

UNIVERSITY OF UTAH, Salt Lake City, Utah;
W. J. Burke; A New Aminoisokation Re-
action; 2 years; $12,900

Henry Eyring; Transport and Thermody-
namic Properties of Liquids and Study of
Rate Processes; 3 years; $89,500

J. Calvin Giddings; Molecular Basis of
Chromatography; 3 years; $28,700

David M. Grant; Molecular and Electron
Conformational Effects on Nuclear Magnetic
Resonance Spectra; 3 years; $37,600

VALPARAISO UNIVERSITY, Valparaiso, Ind.;
Alvin W. Melbohm; Electrochemical Be-
havior of Dimethyl Sulfoxide Solutions; 2
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VANDERBILT UNIVERSITY, Nashville, Tenn.;
Mark M. Jones; Ligand Structures and the
Stability of Complex Ions; 3 years; $23,300

UNIVERSITY OF VERMONT, Burlington, Vt.;
Robert H. Linnen; Interaction of Pyroly
and Oxygen; 2 years; $15,500

VILLANOVA UNIVERSITY, Villanova, Pa.;
Kenneth F. O'Driscoll; Equilibrium Mono-
mer Concentrations in Anionic Vinyl Poly-
merizations; 2 years; $22,900

UNIVERSITY OF VIRGINIA, Charlottesville,
Va.; Thomas I. Crowell; Kinetics of Amino-
Carbonyl Reactions; 3 years; $20,700

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Conformational Effects on Conjugation and
Intramolecular Interaction of Groups in Un-
saturated Mono-, Di-, and Polyacarbonyl
Systems; 3 years; $37,600

Oscar R. Rodig; Smiles Rearrangement In-
volving Heterocyclic Systems; Preparation
of Dipyrrolothiazines; 3 years; $14,500

Paul N. Schatz; Infrared Intensity and
Dispersion Studies in Solids, Liquids, and
Gases; 4 years; $58,100

WASHINGTON UNIVERSITY, Saint Louis, Mo.;
Arthur C. Wahl; Kinetics of Oxidation-Re-
duction Reactions; 3 years; $46,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.;
David F. Eggers, Jr.; High-Resolution Vi-
brational Spectra; 3 years; $31,000

David M. Ritter; Nitrosyl Oxygenase
Radicals; 2 years; $7,200

W. M. Schubert; Acid-Base Catalysis in
Strong Mineral Acid Solution; 3 years;
$57,600
WNYE STATE UNIVERSITY, Detroit, Mich.; Norman L. Allinger; Conformational Effects in Medium Rings; 3 years; $4,500

C. L. Stevens; Gem-Dihalides From the Hofmann Degradation Reaction; 2 years; $2,900

WHITTIER COLLEGE, Walla Walla, Wash.; David L. Frasco; Vibrational Spectra of Ammonium Carbamate and Solid (NH4)2CO3; 2 years; $5,300

UNIVERSITY OF WISCONSIN: Madison, Wis.: John D. Ferry; Molecular Motions in Polyesters; 2 years; $72,000

Louis J. Gosting; Construction and Installation of a Research Diffusometer; 3 years; $33,600

WILLIAM S. JOHNSON; Synthesis of Steroids and Terpenoid Types and Related Studies; 1 year; $37,500

Howard E. Zimmerman; Experimental and Theoretical Approach to Mechanistic Photobiology; 3 years; $19,800

University of WASHINGTON, Seattle, Wash.; Luther L. Lyon; Physical Adsorption and Condensation in Capillaries; 2 years; $18,400

COLLEGE OF WOOSTER, Wooster, Ohio; Thomas E. Ferling; Reactions of Halogens by Other Atom Sources in Solute Media; 2 years; $8,300

John D. Reinheimer; London Forces in Nucleophile Substitution Reactions; $8,600

YALE UNIVERSITY, New Haven, Conn.; William Van Evera; Experimental Chemistry of Divalent Carbon; 3 years; $60,000

Gary Griffin; Preparation and Properties of O-Xylene; 2 years; $11,700

DEVELOPMENTAL BIOLOGY

BOSTON DISPENSARY, Boston, Mass.; Gerhard Schmidt; Embryochromosomal Studies on Lipids, Proteins, and Nucleic Acids; 3 years; $45,700

BRANDEIS UNIVERSITY, Waltham, Mass.; M. Sussman and H. L. Evans; Genetics and Physiology of the Ecdysterone Cell for Silene Mollis Aggregation; 3 years; $52,400

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; C. W. Asling; Morphogenesis of the Inner Ear; 1 year; $6,500

C. R. Grau and F. X. Ogasawara, Davis; Physiology of the Avian Oviduct; 3 years; $57,300

DICKINSON COLLEGE, Carlisle, Pa.; Robert E. Ogren; Biology of the Tapeworm Hecauso Embryo; 3 years; $14,200

DREW INSTITUTE OF TECHNOLOGY, Philadelphia, Pa.; Floyd J. Wiercinski; Role of Calcium in Early Development of Marine Eggs; 1 year; $2,000

Duke University, Durham, N.C.; Kenneth S. McCarry; Biochemistry of Homeostatic Cell Cultures; 3 years; $25,400

Emory University, Atlanta, Ga.; Anthony C. Clement; Embryonic Determination in Ilyanaea; 2 years; $11,500

FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Charles B. Metz, Oceanographic Institute; Studies on Gametes and Embryos of Marine Invertebrate Animals; 3 years; $9,000

GRINNELL COLLEGE, Grinnell, Iowa; Waldo S. Walker; Effect of Mechanical Stimulation and Reorientation on Plants; 2 years; $10,000

HARVARD UNIVERSITY, Cambridge, Mass.; D. W. Fawcett; Cell Differentiation in Hydra; 2 years; $12,000

Ralph H. Wetmore; Differentiation of Vascular Tissue in Plants; 2 years; $30,800

IDAHO STATE COLLEGE, Pocatello, Idaho; Christina M. Richards; Factors Controlling Growth in Tadpoles; 3 years; $12,900

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Albert S. Roufa; Factors Influencing Morphogenesis in the Bud; 3 years; $14,000

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Martin Dworkin; Nutrition and Developmental Physiology of Fruiting Myxobacteria; 2 years; $19,800

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Frederick B. Bank; Vertebrate Upper Respiratory Tract Anatomy; 3 years; $17,100

Andre T. Jagendorf; McCollum-Pratt Institute; Chloroplast Growth Process; 42 months; $93,100

Hans Lauber; Differentiation of Protein Patterns During Development; 3 years; $35,300

Malcolm S. Steinberg, Selective Adhesion on Embryonic Cells; 2 years; $27,300

LE MOYNE COLLEGE, Syracuse, N.Y.; Louis D. De Gennaro; Differentiation of the Glycogen Body of the Chick Embryo; 2 years; $4,400

UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; John W. Rowley; Formation and Development of the Floral Organ Wall; 3 years; $14,100

MEDICAL COLLEGE OF VIRGINIA, Richmond, Va.; Willie M. Reems, Jr.; Differentiation of Plagm Cells in the Pet Mouse; 3 years; $18,400

MEDICAL COLLEGE OF SOUTH CAROLINA, Charleston, S.C.; Elsie Taber; Differentiation, Growth and Function of Gonadal Tissue; 3 years; $28,200

METHODOIST HOSPITAL, Houston, Tex.; Gerald L. Feldman; Studies of Experimentally-Induced Catarracts; 3 years; $16,500

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Donald L. Bland; Organization and Cellular Differentiation in Embryo; 3 years; $31,200

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Wilfrid T. Dempster; Architecture of the Human Skull; 3 years; $31,400

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; William J. L. Felts; Study of the Skeleton of Cetaceae; 1 year; $15,000

Walter Fuegel; Myxobacter Fruiting Formation; 3 years; $13,800

A. Glenn Richards; Structure and Development of Insect Membranes; 2 years; $37,200

MONTANA STATE UNIVERSITY, Missoula, Mont.; E. W. Pfeiffer; Origin of the Ovarian Intestinal Cells of Dipodomys; 1 year; $1,000

UNIVERSITY OF MONTREAL, Montreal, Canada; Hans Selye; Normal and Abnormal Growth in Relation to Invasiveness; 2 years; $16,600
VILLANOVA UNIVERSITY, Villanova, Pa.; Roman Mackay-Mowry; Cell Division and Tissue Differentiation During Leaf Development; 2 years; $10,100

WASHINGTON UNIVERSITY, St. Louis, Mo.; Robert M. Burton; Metabolism of the Developing Central Nervous System; 3 years; $49,500

WAYNE STATE UNIVERSITY, Detroit, Mich.; Werner G. Heim; Changes in the Serum Proteins During the Ontogeny of Mammals; 1 year; $3,000

Western University, Middletown, Conn.; John B. Morrill, Jr.; Development of Specific Proteins in the Molluscan Embryo; 3 years; $28,000

University of Wisconsin, Madison, Wis.; Albert L. Metzenberg; Nuclear Acid and Protein Metabolism During Differentiation in Lethal Mutants of Drosophila; 2 years; $12,800

YALE UNIVERSITY, New Haven, Conn.; Ian K. Ross; Life Cycles, Cytology and Development of Selected Species of Myxomycetes; 3 years; $9,800

J. S. Nicholas; Experimental Analysis of Rat Development; 3 years; $4,100

Yeshiva University, New York, N.Y.; Mayer Aronoff; Embryonic Tissue Maxit and Nuclei besides by the Mouse Embryo; 2 years; $11,400

EARTH SCIENCES

UNIVERSITY OF ALASKA, College, Alaska; Troy L. Peve; Glaciological Investigations in Interior Alaska; 2 years; $7,400

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Norman D. Newell; Pern الموجود הסימן חסר מיקום

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Norman D. Newell; Pern الموجود הסימן חסר מיקום

University of California, Berkeley, Calif.; Edward J. Buehler; Evolution From the Hamilton Group of Western New York; 1 year; $7,400

Brown University, Providence, R.I.; Bruno J. Glietti, P. Donald Eckelmann and Alonso W. Quinn; Petrological and Geochemical Problems Relating to Mountain Building; 3 years; $100,000

University of Buffalo, Buffalo, N.Y.; Edward J. Buehler; Evolution From the Hamilton Group of Western New York; 1 year; $7,400

University of California, Berkeley, Calif.; Daniel I. Axelrod; Los Angeles; The Tertiary Flora of Nevada; 3 years; $20,000

Daniel I. Axelrod and William S. Ting, Los Angeles; Late Cenozoic Fossil Floras of California; 2 years; $18,200

M. M. Bramlette, H. C. Urey and Gustaf Arthemius; Purchase of Electron Microscope; 1 year; $76,800

Ferry Myers; Creep on the San Andreas Fault; 5 years; $51,700
Frank W. Dickson, Los Angeles; Geochemical and Field Studies of Borate Genesis; 2 years; $12,700

J. J. Jurinak, Los Angeles; Ore Forming Processes; 2 years; $4,450

J. Freeman Gilbert and Leon Knopoff, Los Angeles; Seismic Theory and Interpretation; 3 years; $119,800

George C. Kennedy and Leon Adams, Los Angeles; Rapidly-Running Transitions at Very High Pressure; 18 months; $33,400

John E. Tyler, Visibility Laboratory; Scripps Institution of Oceanography, La Jolla; Hydro Optics Research; 2 years; $104,000

Harold C. Urey, Scripps Institution of Oceanography, La Jolla; Isotope Research on Paleotemperatures; 2 years; $33,000

John Verhoogen; Iron-Titanium Oxide Minerals; 3 years; $25,700

Lionel E. Weiss; Structural Geometry of the Repeatedly Deformed Rocks of the Southern Sierra Nevada; 2 years; $9,000

Carter County Museum, Ekalaka, Mont.; Marshall E. Lambert; Fossil Veritebrates of Southeastern Montana; 5 years; $10,000

University of Chile, Santiago, Chile; Cinna mormot; Andean Structure; 2 years; $50,000

University College of Rhodesia and Nyasaland, Salisbury, Southern Rhodesia; Dennis L. Gouch; Paleomagnetic Studies in Southern Rhodesia; 3 years; $22,900

Colorado School of Mines, Golden, Colo.; Robert M. Hutchinson; A Petrographic and Radium-226 Study of the North Part of Pikes Peak, Natholite, Colorado; 2 years; $15,600

Colorado State University Research Foundation, Fort Collins, Colo.; D. B. Simons; Model-Prototype Relationships for Flow of Eccentric Transport in Alluvial Channels; 1 year; $5,100

Columbia University, New York, N.Y.; Wallace S. Broecker; Lamont Geological Observatory; Methods of Age Determination Based on Inequilibrium in the Uranium Decay Series; 3 years; $50,000

Maurice Ewing, Lamont Geological Observatory; Sediment Drilling in Water Covered Areas; 1 year; $50,000

Maurice Ewing, Lamont Geological Observatory; Support of the Research Vessel VEMA; 1 year; $184,600

David B. Ericson, Robert J. Mezies and Alan W. H. Be. Lamont Geological Observatory, Pullsades; Oxygen Isotope Determination on Ancient Surfaces and Bottom Temperatures of the Oceans; 2 years; $57,400

Marshall Kay; Comparison of Paleoecology and Fauna in Northwest Europe With Those in Nevada; 6 months; $8,000

David R. Ericson, Robert J. Mezies, H. N.; Richard E. Stober; Minor Elements in Sulfide Minerals; 2 years; $11,800

Duke University, Durham, N.C.; S. Duncan Horon, Jr.; Nature of Clay Minerals of the Atlantic Coastal Plain; 2 years; $31,300

Basil Lin College, Richmond, Ind.; Ansel M. Peterson; Paleozoic Geology of Eastern Indiana; 3 years; $17,800

Florida State University, Tallahassee, Fla.; Lyman D. Toulmin; Paleocene and Eocene Guide Faunis of the Coastal Plain of Eastern United States; 27 months; $20,400

Franklin and Marshall College, Lancaster, Pa.; Marvin E. Kaufman; Jurassic Rocks in Western Montana; 2 years; $7,150

University of Georgia, Athens, Ga.; Charles A. Salotti; Field Investigations of Copper-Zinc Skarn Deposit at Cotopax, Colorado; 2½ years; $2,500

John S. Schie, Le Potrology of Basal Pennsylvania Rocks of the Southern Appalachian; 2 years; $14,100

University of Hawaii, Honolulu, Hawaii; Gordon A. Macdonald; Geochemistry of Hawaiian Lavae; 1 year; $15,700

Idaho State College, Pocatello, Idaho; J. K. Ladd; Veritebrate Paleontology of the Lemoi Valley Region, Idaho; 1 year; $4,800

University of Illinois, Urbana, Ill.; F. J. Stevenson; Paleobiological Research; 2 years; $15,200

Indiana University Foundation, Bloomington, Ind.; John B. Droste; Effect of Digenesis Upon Clay Minerals in the Saline Environment; 1 year; $9,500

Iowa State University, Ames, Iowa; Don Kirkham; Use of Deuterium in Soil-Plant Research; 2 years; $23,500

John Hopkins University, Baltimore, Md.; Hans F. Egusger; Low-Grade Metamorphic Reactions; 2 years; $23,000

K. B. Montgomery; Analysis of Serial Oceanographic Observations; 3 years; $43,000

University of Kansas, Lawrence, Kans.; William K. Hambly; Origin and Significance of Reverse Drag Fault Displacement; 18 months; $17,000

James A. Peoples, Jr.; Geophysical Investigations of the Midcontinent Gravity High; 1 year; $12,500

Kwakiutl, Newcastle-upon-Tyne, England; Stanley Keith Runcorn; Paleomagnetism; 2 years; $8,700

Lehigh University, Bethlehem, Pa.; J. Donald Ryan; Cleverly-Inyan Kara Paleosurface; 2 years; $17,500

Bradford Willard; Study of the Harvey Bassler Collection; 2 years; $6,000

Los Angeles County Museum, Los Angeles, Calif.; Theodore Downs; The Vertebrate Fauna of the Late Cenozoic of the Imperial Valley, California; 2 years; $8,400

Los Angeles State College Foundation, Los Angeles, Calif.; Perry L. Ehlig; Geology of the Pelona Schist; 2 years; $8,100

Royal R. Marshall, Pasadena, Calif.; Leads in Bases and Eclipsics; 1 year; $7,950

Massachusetts Institute of Technology, Cambridge, Mass.; Arthur J. Bonnet; Situ- and Lower Devonian Shelly Faunas; 3 years; $28,300

Harold E. Fairbairn; Purchase of an X-Ray Spectrophotometer and Associated Equipment; 3 years; $20,000

University of Massachusetts, Amherst, Mass.; George E. McGill; Tectonic Development of the Imbricate Fault Zone of the
Intrusive Rooks of the Wiohita Mountain; 3 years; $10,600

University of Miami, Coral Gables, Fla.; Cesare Emiliani; The Marine Laboratory, Miami; Paleontogenetics of the Wiohita Mountains; 3 years; $50,000

E. F. Koczy; Feasibility Study for a Cruise for Oceanographic Research; 1 year; $18,600

F. F. Koczy, The Marine Laboratory, Miami; Geochemistry of Radioactive Elements in the Marine Environment; 1 year; $13,000

E. F. Koczy; Support of the Research Vessel GERDA; 1 year; $25,000

Gene A. Rusnak and Gote Otlund; Radiocarbon Dating Laboratory; 2 years; $33,700

University of Michigan, Ann Arbor, Mich.; John M. DeNoyer; Geophysical Investigations in the Huerjano Basin; 2 years; $15,600

University of Minnesota, Minneapolis, Minn.; Paul W. Gast; Isotopes of Lead and Strontium; 2 years; $29,000

Frederick M. Swain; Carbon Cycles of the Tertiary Period; 2 years; $10,500

University of Missouri, Columbia, Mo.; Don L. Frizzell; Taxonomic Study of Fossil and Recent Fish Otoliths; 2 years; $10,700

Montana State University, Missoula, Mont.; Robert W. Fields; Stratigraphy and Paleontology of the Intermontane Basins of Western Montana; 3 years; $11,225

John Hower; Comparison of Recent and Ancient Glaucolites; 1 year; $3,000

National Academy of Sciences-National Research Council, Washington, D.C.; John N. Adkins; Experimental Drilling in Deep Water; 1 year; $122,500

John N. Adkins; Study of the Problem of Drilling a Hole to the Mohorovicic Discontinuity; 1 year; $50,500

University of New Hampshire, Durham, N.H.; Cecil J. Schneer; Thermal Basis for Polytpism; 2 years; $20,000

New York University, New York, N.Y.; Brooks F. Ellis; Lithofacies and Ostracod Studies in Long Island Sound; 1 year; $5,000

University of North Carolina, Chapel Hill, N.C.; Virgil I. Mann; Gravity Survey in North Carolina; 2 years; $12,700

Ohio State University, Columbus, Ohio; Kathryn H. Cisby; Pollen Studies and Pleistocene Chronology of San Augustin Plains; 2 years; $3,350

Office of Naval Research, Washington, D.C.; Capt. J. C. Myers, USN; Committee on Oceanography of the National Academy of Sciences; 1 year; $20,000

Ohio State University Research Foundation, Columbus, Ohio; R. P. Goldthwait; Structure in the Stagnant Ice of Burroughs Glacier, Glacier Bay, Alaska; 15 months; $5,000

Leslie C. Coleman; Ionic Substitution in Monoclinic Pyroxenes; 2 years; $16,400

Richard P. Goldthwait; Slope Form in Relation to Micro-Climate; 2 years; $3,500

University of Oklahoma Research Institute, Norman, Okla.; Charles G. Dodd; Clay-Mineral Geochemical Research Program Related to the Occurrence of Borates; 1 year; $10,400

H. E. Hunter; Petrology of the Basic Intrusive Rocks of the Wichita Mountains; 1 year; $12,000

Oregon State College, Corvallis, Oreg.; Wayne V. Burt; Operation of an Oceanographic Research Vessel; 1 year; $50,000

W. E. Deere; Mechanics; Structure and Petrogenesis of Part of the Wallora Mountains; 4 years; $300

University of Oregon, Eugene, Oreg.; J. Arnold Shotwell; Museum of Natural History; Late Eocene Mammals of the Clarno Fauna of Oregon; 2 years; $13,500

Pennsylvania State University, University Park, Pa.; Benjamin F. Howell, Jr.; Seismic Measurements of Crustal Thickness in the Central Appalachian Region; 2 years; $15,000

M. L. Keith; Composition of Calcareous Fossils and Limestones; 2 years; $18,500

E. F. Osborne and Arnold Muan; The Role of Oxygen Pressure in the Crystallization and Differentiation of Basaltic Magmas; 3 years; $50,000

Joseph V. Smith and M. E. Bell; Mineralogy of the Amphiboles; 1 year; $5,200

O. F. Tuttle and C. W. Burnham; Vapor Phase Composition in Granitic Magmas; 2 years; $70,000

Pomona College, Claremont, Calif.; Gerhard F. M. Oertel; Mechanical Anisotropy of Solids During Deformation; 1 year; $11,500

Princeton University, Princeton, N.J.; William E. Bonini; Seismic Crustal Measurements; 2 months; $9,500

Alfred W. McHarg; Paleogeography and Tectonic Developments of Part of the Northern Calcareous Alps in Early Messinian Time; 3 years; $22,000

John C. Maxwell; Nature and Origin of the Rocky Mountain Crusted Structural Features; 2 years; $27,500

Purdue Research Foundation, Lafayette, Ind.; Philip F. Low; The Relation Between Ion Diffusion in Clay Systems and the Properties of Clay-adsorbed Water; 8 years; $18,000

Rensselaer Polytechnic Institute, Troy, N.Y.; Samuel Katz; Elastic Constants at High Pressure and Temperature; 1 year; $8,600

Saint Louis University, St. Louis, Mo.; Otto W. Benz; Motion of the Earth's Surface Produced by the S. Wave of Earthquakes; 1 year; $8,400

Smithsonian Institution, Washington, D.C.; E. P. Henderson; Acquisition of Beyer Tekite Collection; 6 months; $8,000

Southern Methodist University, Dallas, Tex.; Eugene Herrin, Dallas Seismological Observatory; Study of Regional Variations in Seismic Travel Time Data; 2 years; $28,700

University of South Dakota, Vermillion, S. Dak.; Hugh D. Carlson; The Petrology of the Tertiary Igneous Rocks of the Black Hills of South Dakota; 2 years; $25,000

University of Southern California, Los Angeles, Calif.; K. C. Emery; Partial Support of Operation B/V Velero IV; 2 years; $80,000

Paul Saltman and K. O. Emery; Amino Acids in Basin Sediments Of Southern California; 1 year; $23,300

Syracuse University Research Institute, Syracuse, N.Y.; Dirk de Waard; Metamorphic-Tectonic Analysis of Precambrian Structures in the Southwestern Adirondack Mountains; 2 years; $62,500

Texas Agricultural and Mechanical Re-
<table>
<thead>
<tr>
<th>Research Foundation</th>
<th>Project</th>
<th>Location</th>
<th>Principal Investigator</th>
<th>Amount</th>
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<td>SEARCH FOUNDATION, College Station, Tex.</td>
<td>Richard G. Bader; Bathymetry and Sediments of the Bay of Campeche</td>
<td>2 years</td>
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<td>Donald W. Hood; C14/C12 Ratio of Organic and Inorganic Carbon Fraction of Waters of the Caribbean and Gulf of Mexico</td>
<td>1 year</td>
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<td>Donald W. Hood; The Calcium Carbonate Solubility Equilibrium in Sea Water</td>
<td>2 years</td>
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<td>Hugh J. McElhaney; Aid for Operating a Research Vessel for Basic Studies in Physical Oceanography and Marine Geophysics</td>
<td>1 year</td>
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<td>UNIVERSITY OF TEXAS, Austin, Tex.; Virgil E. Barnes; Research on Composition and Origin of Textures</td>
<td>2 years</td>
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<td>Ronald K. Deford; Study of the Petrography, Biostratigraphy</td>
<td>2 years</td>
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<tr>
<td>Ernest L. Ludidell, Jr.; A Paleoeological and Chronological Study of the fossil Vertebrates Paunas from the Pleistocene River Terrace Deposits of Central Texas</td>
<td>2 years</td>
<td>$8,500</td>
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<td>With Young; Curating the Atkins Paleontological Collections; 4 years</td>
<td>$32,000</td>
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<td>U.S. COAST AND GEODETIC SURVEY, Washington, D.C.; J. H. Nelson; World Data Center for Geomagnetism, Gravity, and Seismology</td>
<td>1 year</td>
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<td>Harris B. Stewart, Jr.; Oceanographic Studies; 1 year</td>
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<td>UNIVERSITY OF UTAH, Salt Lake City, Utah; Kenneth L. Cook; Geophysical Studies of the U.S. in the Great Trenches in Utah; 18 months;</td>
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<td>$22,000</td>
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<td>Armand J. Eardley; Study of the Quaternary Sediments of the Great Salt Lake Desert; 2 years</td>
<td>$27,100</td>
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<td>VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; Bruce W. Nelson; Clay Mineral Diagenesis</td>
<td>3 years</td>
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<td>Charles I. Rich; Virginia Agriculture Experiment Station; Aluminum Pilation in Interlayers of Expanded Clay Minerals</td>
<td>3 years</td>
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<td>WASHINGTON UNIVERSITY, St. Louis, Mo.; H. N. Andrews, Jr.; Paleozoic Plants</td>
<td>3 years</td>
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<td>UNIVERSITY OF WASHINGTON, Seattle, Wash.; J. H. Sharp; Spring Activity of Seguoa Wood; 1 year</td>
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<td>Richard H. Fleming; Preliminary Mass Spectrometric Investigations; 1 year</td>
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<td>Richard H. Fleming; Recent Sediments in Northeast Pacific</td>
<td>2 years</td>
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<td>J. Hoover Macklin; Tertiary Deformational History of the Great Basin-Colorado Plateau Transition Zone in Southwestern Utah</td>
<td>3 years</td>
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<td>Francis A. Richards; Chemical and Related Oceanographic Studies of Oxygen-Deficient Marine Environments</td>
<td>4 years</td>
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<td>UNIVERSITY OF WISCONSIN, Madison, Wis.; John C. Rose; Development of a Portable Apparatus for Determination of Absolute Gravity to One Milligal or Better</td>
<td>1 year</td>
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<td>George P. Woolard; Gravity Data in the United States</td>
<td>1 year</td>
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<tr>
<td>George P. Woolard, and R. P. Meyer; Continuation of Seismic Refraction Crustal Studies in Selected Areas of Geologic Structure and/or Pronounced Gravity Anomalies; 1 year</td>
<td>$54,700</td>
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<td>WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, Mass.; Vaughan T. Bowen; Chemical and Geochemical Studies in the Sea; 2 years; $300,000</td>
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<td>J. B. Hersey; Analysis of Geological Survey Data; 1 year; $15,000</td>
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<tr>
<td>UNIVERSITY OF ALASKA, College, Alaska; Donald J. Cook; The Magnetic Susceptibilities of Principal Minerals of the Light Metal Group; 3 years</td>
<td>$39,800</td>
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**ECONOMIC SCIENCES**

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<th>University</th>
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<th>Location</th>
<th>Principal Investigator</th>
<th>Amount</th>
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<tr>
<td>UNIVERSITY OF CHICAGO, Chicago, Ill.; Norton S. Ginsburg; Study of Asian Urbanization</td>
<td>1 year</td>
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<tr>
<td>HARVARD UNIVERSITY, Cambridge, Mass.; Burton H. Klein; Economics of Research and Development</td>
<td>1 year</td>
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<td>Thomas C. Schelling; Experimental Study of Bargaining; 15 months; $26,500</td>
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<td>UNIVERSITY OF IOWA, Iowa City, Iowa; George Ladd and Wayne Fuller; Distributed Lags in Econometric Analysis; 2 years; $17,500</td>
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<td>UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Daniel J. Suits; Research in Quantitative Economics; 3 years; $56,500</td>
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<td>UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Jacob Schmookler; The Economics of Invention; 2 years; $2,850</td>
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<td>NATIONAL BREAD OF ECONOMIC RESEARCH, Inc., New York, N.Y.; Geoffrey H. Moore; Computer Studies of Business Cycles; 3 years; $96,000</td>
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<td>PORTLAND STATE COLLEGE, Portland, Ore.; Clarke H. Brooke, Jr.; Geography of Famine in Tanganyika; 1 year; $15,000</td>
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<td>PRINCETON UNIVERSITY, Princeton, N.J.; Fritz Machlup; Economic Aspects of Inventions; 2 years; $28,130</td>
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<td>Oskar Morgenstern; Mathematical Methods for Time Series Analysis; 3 years; $50,000</td>
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<tr>
<td>PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Vernon W. Rutten; Interrelationships Among Technological Change, Research Expenditures and Resource Requirements; 2 years; $28,500</td>
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<td>UNIVERSITY OF ROCHESTER, Rochester, N.Y.; Alexander Eckstein; Study of Economic Fluctuations; 2 years; $18,400</td>
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<td>Lionel W. McKenzie; Theory of the Competitive Economy; 3 years; $32,500</td>
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<td>Richard N. Rosett; Investigation of Household Economic Behavior; $1,400</td>
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<td>Edward Zabel; Efficient Accumulation of Capital; 1 year; $2,900</td>
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<td>SACRAMENTO STATE COLLEGE, Sacramento, Calif.; David E. Sopher; Tribal Relocation in the Chittagong Hills; $14,100</td>
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<td>UNIVERSITY OF WASHINGTON, Seattle, Wash.; Richard L. Morrill; Simulation of Central Place Patterns; 2 years; $18,500</td>
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<td>UNIVERSITY OF WISCONSIN, Madison, Wis.; Guy Orcutt; Economic Model Formulation and Analysis; 3 years; $104,000</td>
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**ENGINEERING SCIENCES**

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<th>University</th>
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<th>Principal Investigator</th>
<th>Amount</th>
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<tr>
<td>UNIVERSITY OF ALASKA, College, Alaska; Donald J. Cook; The Magnetic Susceptibilities of Principal Minerals of the Light Metal Group; 3 years</td>
<td>$39,800</td>
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<td>Institution</td>
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<td>Duration</td>
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<tr>
<td>Johns Hopkins University, Baltimore, Md.</td>
<td>Viscous and Thermoviscoelastic Properties of Light Hydrocarbons at High Pressure and Low Temperature</td>
<td>3 years</td>
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<tr>
<td>Robert W. Fristrom</td>
<td>Microstructure of Low Pressure Flame Front</td>
<td>1 year</td>
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<tr>
<td>Jerome Gavis</td>
<td>Properties of Viscous and Viscelastic Fluids by Wave Propagation Experiments in Jests</td>
<td>3 years</td>
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<td>Jerome Gavis</td>
<td>Transport Phenomena in Flow of Non-Newtonian Fluids</td>
<td>2 years</td>
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<td>Kansas State University, Manhattan, Kans.</td>
<td>Magnetic and Component Characterization of Non-conductive Contaminants in Estuaries</td>
<td>2 years</td>
<td>$17,300</td>
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<tr>
<td>Massachusetts Institute of Technology, Cambridge, Mass.</td>
<td>Thermodynamics of Melted Gases</td>
<td>1 year</td>
<td>$6,200</td>
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<td>New York, N.Y.</td>
<td>Radiation Design of Common Soil Minerals</td>
<td>2 years</td>
<td>$19,900</td>
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<td>Manhattan College</td>
<td>Study of Consolidation and Remolded Clay Minerals</td>
<td>3 years</td>
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<td>Michigan State University, East Lansing, Mich.</td>
<td>Thermodynamic Properties of Light Hydrocarbons at High Pressure and Low Temperature</td>
<td>3 years</td>
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<td>Joseph Datsko</td>
<td>Mechanoelasticity Study</td>
<td>3 years</td>
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<td>University of Michigan, Ann Arbor, Mich.</td>
<td>The Effect of Transverse Vibrations of a Heated Surface on Heat Transfer in Free Convection</td>
<td>2 years</td>
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<td>Lawrence H. Van Vlaenderen</td>
<td>Input Impedance for a Biconical Antenna</td>
<td>6 months</td>
<td>$8,600</td>
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<td>Lawrence H. Van Vlaenderen</td>
<td>Plastic Deformation of Nonmetallic Phases Within Ductile Metals</td>
<td>2 years</td>
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<tr>
<td>W. S. Singletary</td>
<td>Input Impedance for a Biconical Antenna</td>
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<td>W. S. Singletary</td>
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<td>Iowa State University, Ames, Iowa</td>
<td>Viscelastic and Component Characterization of Non-conductive Contaminants in Estuaries</td>
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<td>Paul F. Zweifel</td>
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<td>D. L. Katz</td>
<td>Thermodynamic Properties of Light Hydrocarbons at High Pressure and Low Temperature</td>
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<td>D. L. Katz</td>
<td>The Behavior of Structural Metals Under Slow and Rapid Reversal of Loading</td>
<td>2 years</td>
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<td>M. H. Davis</td>
<td>Mechanism and Kinetics of Intermediate Reactions</td>
<td>3 years</td>
<td>$31,700</td>
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<tr>
<td>Paul R. Shaffer and D. U. Deere</td>
<td>Engineering Properties of Glacial Deposits</td>
<td>1 year</td>
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<td>Iowa State University, Ames, Iowa</td>
<td>Viscelastic and Component Characterization of Non-conductive Contaminants in Estuaries</td>
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<td>Paul F. Zweifel</td>
<td>Neutron Optics</td>
<td>3 years</td>
<td>$84,300</td>
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UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Neal R. Amundson; Theoretical Analysis of Chemical Reactors; 2 years; $30,000

John S. Dahler; Transport Properties of Polyatomic and Chemically Reactive Fluids; 3 years; $22,600

Ernst R. G. Eckert; Radiative Heat Transfer Analyses; 3 years; $50,000

Leland M. Goodman and Arthur R. Robinson; An Investigation of Contact Stresses; 2 years; $34,300

Walter T. Graves; The Rotational Characteristics of Plastic Hinges in Reinforced Concrete Members Subjected to Axial Loads and Moments; 1 year; $8,500

Rudolph Hermann, Hypersonic Facilities, Rosemount Aeronautical Laboratories; Study of Dissociation Effects in Front of Blunt Aerodynamic Bodies at Hypersonic Air Speeds and Temperatures up to 8000 E; 1 year; $26,700

Warren E. Ihele; Measurement of Prandtl Number and Heat Conductivity of Gases; 2 years; $31,200

Robert F. Lambert; Sound Propagation of Moving Media; 1 year; $17,825

Arthur H. Madden, Jr.; Coalescence Rates in Dynamic Liquid-Liquid Systems; 3 years; $26,700

William O. Muckenhirn; Investigation of Thin Magnetic Films; 2 years; $24,400

Eugene P. Pfleider; Behavior of Rock Under Stress; 2 years; $26,900

Edgar L. Piret; Crushing and Grinding Energies; 8 months; $3,000

L. E. Scriven II; Interface Mechanics; 2 years; $25,400

UNIVERSITY OF MONTANA, Columbia, Mo.; Martin E. Straumanis, Rolla; Determination of Imperfections by the X-ray and Density Method; 2 years; $22,500

UNIVERSITY OF MISSOURI, Columbia, Mo.; Martin E. Straumanis, Rolla; Determination of Imperfections by the X-ray and Density Method; 2 years; $22,500

University of Nebraska, Lincoln, Neb.; Tsugut Sarpkaya; Vortex Formation and Drag in Unsteady Flow Past Bluff Bodies; 3 years; $34,100

James H. Weber; The Continuous Dissolution of Metals and Metallic Alloys; 20 months; $16,500

New York University, New York, N.Y.; Fred Landis, Transient Free Convection Within Fully Enclosed Regions; 2 years; $30,800

H. F. Ludloff; Three Topics Selected from the Field of Magneto-Aerodynamics; 2 years; $22,000

James Michalos and Edward Wilson; Response of Pleural Systems Subjected to Moving Forcing Functions; 2 years; $36,200

Wheeler K. Mueller; Natural Convection Heat Transfer Between Coastal Horizontal Surfaces; 2 years; $20,000

Robert E. Treybal; Liquid Extraction in Single-Stage Agitated Vessels; 2 years; $9,500

Kenneth O. Beatty and Frances M. Richardson; Photographic Study of Unusual Flow Patterns in Turbulent Shear Flow; 1 year; $14,000

C. A. Hart; Mechanism of the Movement of Moisture Through Wood; 30 months; $50,400

NORTHWESTERN UNIVERSITY, Evanston, Ill.; S. G. Bankoff; Subcooled Nuclear Boiling; 2 years; $21,500

New York University; Upstream Nonuniformities (UNU) Related to Fluid Meter Performance; 1 year; $12,900

Ohio University, Athens, Ohio; Richard S. Mayer; Mass Diffusion Gas Separation; An Investigation of the Conviction Velocities Within a Mass Diffusion Column; 2 years; $7,800

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; Andrew Congaree, Jr.; Vapor-Atomicity in Metals; 3 years; $38,600

Robert H. Perry; Heat Transfer With Placing Fluids in Porous Media; 3 years; $49,700

Robert H. Perry; Kinetics of Gas-Liquid Reactions; 2 years; $18,700

C. M. Slepcevich; Kinetic Study of the Formation of Cyclohexene as Elevated Pressures and Temperatures; 2 years; $17,800

Oregon State College, Corvallis, Oreg.; John W. Wolfe; Constant Soil Moisture Content During Plant Growth; 2 years; $17,400

Pennsylvania State University, University Park, Pa.; Harry A. Atwater; Electron Paramagnetic Resonance of Irradiated Polymer Materials; 2 years; $46,900

Howard L. Hartman; The Mechanics of Bristle Fracture in Rock Under Impact Loading; 3 years; $32,600

University of Pennsylvania, Philadelphia, Pa.; Y. H. Ku; Moore School of Electrical Engineering; Nonlinear Electro Oscillations; 3 years; $69,100

Paul R. Trumpler; Purchase and Installation of a Centrifugal Compressor; 1 year; $20,700

POLYTECHNIC INSTITUTE OF BROOKLYN, Brooklyn, N.Y.; Paul F. Brulns; High Temperature Phosphate Reinforced Cerments; 1 year; $8,200

Princeton University, Princeton, N.J.; Robert M. Drake, Jr., and Michel Boudart; Design, Fabrication and Utilization of a High Energy Beam; 2 years; $98,700

Purdue Research Foundation, Lafayette, Ind.; J. L. Bogdanoff; Probability Distributions of the Dynamical Behavior of Some Disordered Systems; 2 years; $25,400

J. W. Delilleur; Mechanics of Turbulence in Flows With Pressure Flows; 2 years; $31,700

John E. Gibson; A Synthesis Procedure for Non-Linear Transfer Function of an Ele-
Robert Goulard; Integration of the Transfer of Radiant Energy into the Field of Fluid Dynamics; 1 year; $3,600
Eugene H. Winsler; Steady Flow of Non-Newtonian Fluids in Three-Dimensional Ducts; 2 years; $12,600

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; Murray M. Gilkerson; The Relation of the Micropore Structure of Solid Catalysts to Mass Transfer Rates; 2 years; $31,400

ResearcH Foundation, Oklahoma State University, Stillwater, Okla.; J. H. Boggs; Forced Convection Local Boiling for a Binary Mixture; 1 year; $8,500

Milan K. Jovanov and Donald R. Haworth; Research on the Radiation Characteristics of High Temperature, Dissociated and Ionized Gas Fields; 2 years; $54,100

Rutger's, The State University, New Brunswick, N.J.; Marvin L. Granstrom; The Kinetics of Formation, Oxidation-Reduction, and Disinfection Reactions Involving Chlorine Dioxide; 3 years; $32,800

John K. Koening; Correlating the Aging Phenomenon of Ceramic Ferroelectric With Crystalline Properties of the Single Crystal; 1 year; $6,400

Evel T. Smyth; Study of the Mechanical Properties of Glass; 2 years; $31,600

State University of Iowa, Iowa City, Iowa; Karl Kammermeyer; Barrier Flow; 3 years; $56,400

Stanford University, Stanford, Calif.; Robert H. Eustis; Heat Transfer From Impinging Air Jets to a Plane Wall; 5 years; $53,200

Robert H. Eustis; Study of Heat Transfer to Gas Bubbles in Liquids, Part II; 2 years; $33,300

M. N. Goodier; Nonlinear Automatic Control; 1 year; $9,400

William H. Schwartz; A Turbulent Mixing Problem; 2 years; $27,500

Stevens Institute of Technology, Hoboken, N.J.; Ernest J. Henley and Theodore Gola; Ionization Patterns in Condensed Systems; 1 year; $12,900

Syracuse University Research Institute, Syracuse, N.Y.; Benjamin A. Waunal and Arthur H. Fulsid; Shock Deflection Measurements by Photogrammetric Methods; 1 year; $11,000

University of Texas, Austin, Tex.; P. M. Ferguson; The Long Concrete Column as a Part of a Rectangular Frame; 3 years; $39,400

N .J. McNetta; Pressure-Volume-Temperature Relations of Gases at Low Pressures; 8 years; $81,800

John J. McNetta; The Solubilities and Distribution of H2O, CO2, and H2S in Petroleum Hydrocarbon Mixtures at Elevated Pressures and Temperatures; 2 years; $55,500

Enrico Volterra; Internal Constraints Applied to Dynamic Problems; 3 years; $23,800

UNIVERSITY OF ALABAMA, College, Alabama; J. Stenger Weeden; Dynamics of Territory Size in Sipizzella Arbores; 8 years; $15,000

American Museum of Natural History, New York, N.Y.; Charles M. Breder, Jr.; Ecological Adjustments of Melliniana and Ants; 8 years; $9,500

Brooks F. Ellis and A. R. Messina; Rearranging Nucleate Pool Boiling Systems; 1 year; $9,500

Albert S. Kobayashi and Emmett E. Day; Fringe Multiplication of Birefringent Coating; 1 year; $5,600

Douglas H. Polonsky; Transformation Studies in Copper-Rich Alloys of Copper and Silicon; 2 years; $15,100

Ling Y. Wel; Diffusion in and Optical Absorption by III-V Components; 2 years; $22,800

University of Wisconsin, Madison, Wis.; Byron R. Bird; Transport Phenomena in Non-Newtonian Fluids; 3 years; $88,800

Richard A. Dodd; The Function of Paint Defects in the Cyclic Plastic Deformation of Metals; 3 years; $44,000

John A. Dulle; The Direct Conversion of Solar Energy to Power; 2 years; $22,500

Woods Hole Oceanographic Institution, Woods Hole, Mass.; John M. Zelger and Robert L. Miller; A Generalized Wave Driven Mechanism for Near-Shore Sediment Patterns; 1 year; $38,000

Worcester Polytechnic Institute, Worcester, Mass.; C. W. Shipman; Momentum and Mass Transport and Rates of Combustion Reactions in Turbulent Shear Flow; 2 years; $20,500

Environmental Biology

University of Arizona, Tempe, Ariz.; Gerald H. Smith; Community Metabolism in Montezuma Well; 2 years; $23,200

University of Arizona, Tucson, Ariz.; Paul S. Martin; Postglacial Pollen Sequence in the Southwest; 2 years; $33,500
<table>
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<tr>
<th>Institution</th>
<th>Project Title</th>
<th>Supervisor(s)</th>
<th>Location</th>
<th>Duration</th>
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<td>University of British Columbia, Vancouver, Canada</td>
<td>Paul A. Dehnel</td>
<td>Institute of Marine Resources, La Jolla</td>
<td>2 years</td>
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<td>University of California, Berkeley, Calif.</td>
<td>Wayne M. Kenney</td>
<td>Marine Biology, La Jolla</td>
<td>2 years</td>
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<td>William L. Belser, Scripps Institution of Oceanography, La Jolla</td>
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<td>Oceanography, La Jolla</td>
<td>2 years</td>
<td>$12,000</td>
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<td>University of California, Berkeley, Calif.</td>
<td>Richard T. Ward and Frank B. Salisbury</td>
<td>Oceanography, La Jolla</td>
<td>2 years</td>
<td>$11,500</td>
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<td>University of California, Berkeley, Calif.</td>
<td>R. W. Denny</td>
<td>Benthic Fauna of the Continental Slope</td>
<td>1 year</td>
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<td>University of California, Berkeley, Calif.</td>
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<td>University of California, Berkeley, Calif.</td>
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maine in Lacustrine Sediments; 3 years; $22,700.

IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, Ames, Iowa.; Kenneth D. Carlander; Biology of Caddis and Mayflies; 3 years; $22,500.

IPOCHI FOUNDATION, Chicago, Ill.; Clifford E. Ahlgren; Quetico-Superior Wilderness Research Center; Effects of Fire on Coniferous Forests; 2 years; $9,800.

LA SIERRA COLLEGE, California, Calif.; Karl W. Lathrop; Ecology of the Grasslands of the Tenaja Range; 1 year; $2,700.

MARQUETTE UNIVERSITY, Milwaukee, Wis.; Reesm M. Dannell; Quantitative Aspects of Secondary Production in Estuarine Fish Populations; 2 years; $12,000.

UNIVERSITY OF MIAMI, Coral Gables, Fla.; John E. Randall, The Marine Laboratory, Miami; Ecology of Coral Reef Fishes; 1 year; $14,600.

Ruth L. Wormald, The Marine Laboratory, Miami; Distribution of Pteropods in the Florida Current; 1 year; $4,000.

Peter J. Wangersky, The Marine Laboratory; Prediction of Population Growth Patterns; 2 years; $5,600.

MICHIGAN STATE UNIVERSITY, East Lansing, Mich.; E. W. Roefoles and P. O. Fromm; Influence of Photoperiodicity and Thyroid Activity on Fish Growth; 2 years; $7,300.

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Frank C. Bensom; Structure and Composition of Insect Communities; 3 years; $35,200.

Nelson G. Hirston; Interspecific Relationships in Populations of Paramecium; 4 years; $42,800.

UNIVERSITY OF MICHIGAN RESEARCH INSTITUTE, Ann Arbor, Mich.; William S. Benninghoff and Claude W. Hibble; Pollen Analysis of Late Cenozoic Sediments; 2 years; $6,800.


Thomas F. Waters; Trophic Structure of Fresh Water Stream Communities; 3 years; $23,200.

MISSOURI STATE UNIVERSITY, Missouri, Mont.; Richard D. Taber and Robert S. Hoffman; Ecology of Alpine Communities; 1 year; $2,700.

John J. Craighead; Ecology of Ursus Horribilis; 5 years; $19,400.

NATIONAL PARK SERVICE, U.S. Department of the Interior, Carlsbad, N. Mex.; James K. Baker; Biology of Petroechidium Falta; 3 years; $5,700.

NORTH DAKOTA STATE UNIVERSITY, Fargo, N. Dak.; Robert W. Goss; Mycorrhiza of Pinus Ponderosa in Grassland Soils; 1 year; $9,900.

NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; Lora M. Shielies; Algae and Periphyton of Wetland Soils; 1 year; $19,600.

NEW MEXICO STATE UNIVERSITY, State College, N. Mex.; Ralph J. Raitt; Annual Cycle of Lophotyrus Gambelli; 2 years; $5,200.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N.C.; William E. Faby; Meristic Structures in Fishes; 3 years; $30,100.

Gerald S. Posner; Dynamics of an Estuarine Plankton Population; 3 years; $26,500.

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Paul B. Kannowski; Form and Distribution and Populations in Relation to Environmental Factors; 3 years; $8,300.

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Robert F. McLaughlin; Quantitative Ecology of the Population of the Catskills; 4 years; $15,400.

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; J. Gordon Ogden; Pollen-Sтратigraphic Studies on the Vegetational and Climatic History of Ohio; 3 years; $12,800.

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; William T. Fenoufind; Plant Succession in a Tall Grass Prairie; 2 years; $9,300.

OREGON STATE COLLEGE, Corvallis, Oreg.; W. K. Ferril; Photosynthetic and Respiration Behavior of Douglas-Fir Ecosystems; 4 years; $35,600.

Julius A. Rudinsky; Population Dynamics of the Douglas-Fir Beetle; 2 years; $7,000.

Charles E. Warren; Dynamics of Simplified Stream Communities; 3 years; $24,500.

Ernest Wright and W. B. Bollen; Soil Microbiology of the South and West Aspects of Coast Range Forest Slopes; 1 year; $1,720.

UNIVERSITY OF OREGON, Eugene, Oreg.; Peter W. Frank; A Population Study of Intertidal Invertebrates; 8 years; $13,300.

J. Arnold Shotwell, Museum of Natural History; Environmental Change as a Factor in Mammalian Evolution; 2 years; $19,000.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Robert H. MacArthur; Comparison of Bird Species, Diversity and Habitat; 3 years; $18,300.

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Richard C. Dugdale; Phosphorus and Nitrogen Metabolism of Alaska Lakes; 2 years; $27,000.

PRINCIPIA COLLEGE, Elsah, Ill.; Paul D. Kilburn; Species-Area Relationships in Vegetation Types; 3 years; $14,300.

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.; Durward L. Allen; Dynamics and Ecology of Custer Canadensis; 3 years; $17,800.

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N.Y.; John G. New, State University Teachers College, Oneonta; Life History of Percaflu Peltata Peltata (Stauffer); 3 years; $9,000.

UNIVERSITY OF RHODE ISLAND, Kingston, R.I.; Nelson Marshall; Research on Life History of Acipenser Irradians; 3 years; $13,700.

RICK'S COLLEGE, Rexburg, Idaho; L. C. Pearson; Annual Energy Budgets of Arid Plant Communities; 2 years; $6,000.

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N.J.; Paul G. Peacock; The Effects of Social Organization and Stress on Rodent Populations; 3 years; $23,300.

ST. OLAF COLLEGE, Northfield, Minn.; Howard D. Orr; Orientation of Small Mammals to Specific Areas; 2 years; $7,000.

UNIVERSITY OF ST. THOMAS, Houston, Tex.; J. P. Kennedy; Reproductive Success in Sceloporus; 2 years; $12,500.

SAN JOSE STATE COLLEGE, San Jose, Calif.; L. Richard Mewaldt; Migratory Restlessness in Birds; 3 years; $12,400.

UNIVERSITY OF SASKATCHEWAN, Saskatoon, Canada; Donald S. Rawson; Dissolved Solids and Lake-Stream Productivity; 2 years; $10,100.
John W. Keanl~bter; Energy Requirements of Ben~tic Marine Communities; 3 years; $45,600

Bostwick H. Ketchum; Microbiological Nutritio~ in the Oeans; 3 years; $43,500

Bostwick H. Ketchum; Nitrogen Cycle in the Sea; 3 years; $41,600

John H. Ryther; Environmental Physiology of Marine Plankton Algae; 3 years; $58,300

Mary Sears; Environmental Factors in Zooplankton Distribution; 1 year; $15,800

Yale University, New Haven, Conn.; James M. Blunt; An Ecological Study of Swidden Agriculture; 1 year; $10,000

Edward S. Deevey, Osborn Zoological Laboratory; Paleontol~; 2 years; $20,000

S. Dillon Ripley, Peabody Museum of Natural History; Comparative Analytical Study of Megapode Developmental Adaptations; 2 years; $6,800

Talbot H. Watermann; Diurnal Migrations of Aphotic Zone Zooplankton; 2 years; $12,500

GENETIC BIOLOGY

University of Arizona, Tucson, Ariz.; William B. Reed; Evolutionary Studies in the Genus Drosophila; 1 year; $9,200

Berkeley College, Berkeley, Calif.; Frank Seto; Arsenic of Action of Recessive Lethals in Drosophila Melanogaster; 2 years; $5,000

Brandeis University, Waltham, Mass.; Albert Kelner; Spontaneous Mutation in Bacteria; 3 years; $30,000

California Institute of Technology, Pasadena, Calif.; N. H. Horowitz; Genetic Studies on Enzyme Synthesis; 3 years; $76,800

University of California, Berkeley, Calif.; David F. Bish; Kinetic Synthesis and Role of Histones in Cell Division and Development; 2 years; $29,800

Spencer W. Brown; Nature and Evolution of Lecano-Diatomid Genetic Systems; 3 years; $50,800

Bernard O. Flinnern; Los Angeles; Genetic Studies With Dwarf Mutants of Zea Mays; 3 years; $61,500

Charles M. Riek, Davis; Cyto-Genetics of Tomato Species Hybrids; 4 years; $51,400

Richard W. Siegel, Los Angeles; Analyses of Hereditary Endosymbiosis and Mating Type Determination in Paramecium; 3 years; $27,200

Richard Snow; Davis; Chromosomal Rearri~ement in Two Species of Clarkia; 2 years; $7,800

David A. Rodgers and Gerald E. McClearn; Ethyl Alcohol Preference of Mice; 1 year; $10,000

G. Ledyar~ Stebbins, Davis; Developmental Genetics of Single Gene Differences in Barley; 2 years; $41,000

University of Chicago, Chicago, 111.; Edward D. Garber; Chromosomal and Genetic Homology in the Genus Cotinina; 3 years; $30,800

Hewson Swift; Cytotoxicological Study on Nucleo Acids; 3 years; $73,500

Children's Cancer Research Foundation, Boston, Mass.; George Xergianis; Genetics and Cytology of the Chinese Hamster; 2 years; $50,000

John W. Keanl~bter; Energy Requirements of Ben~tic Marine Communities; 3 years; $45,600

Bostwick H. Ketchum; Microbiological Nutritio~ in the Oeans; 3 years; $43,500

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University of Chicago, Chicago, 111.; Edward D. Garber; Chromosomal and Genetic Homology in the Genus Cotinina; 3 years; $30,800

Hewson Swift; Cytotoxicological Study on Nucleo Acids; 3 years; $73,500

Children's Cancer Research Foundation, Boston, Mass.; George Xergianis; Genetics and Cytology of the Chinese Hamster; 2 years; $50,000

John W. Keanl~bter; Energy Requirements of Ben~tic Marine Communities; 3 years; $45,600

Bostwick H. Ketchum; Microbiological Nutritio~ in the Oeans; 3 years; $43,500

Bostwick H. Ketchum; Nitrogen Cycle in the Sea; 3 years; $41,600

John H. Ryther; Environmental Physiology of Marine Plankton Algae; 3 years; $58,300

Mary Sears; Environmental Factors in Zooplankton Distribution; 1 year; $15,800

Yale University, New Haven, Conn.; James M. Blunt; An Ecological Study of Swidden Agriculture; 1 year; $10,000

Edward S. Deevey, Osborn Zoological Laboratory; Paleontol~; 2 years; $20,000

S. Dillon Ripley, Peabody Museum of Natural History; Comparative Analytical Study of Megapode Developmental Adaptations; 2 years; $6,800

Talbot H. Watermann; Diurnal Migrations of Aphotic Zone Zooplankton; 2 years; $12,500

GENETIC BIOLOGY

University of Arizona, Tucson, Ariz.; William B. Reed; Evolutionary Studies in the Genus Drosophila; 1 year; $9,200

Berkeley College, Berkeley, Calif.; Frank Seto; Arsenic of Action of Recessive Lethals in Drosophila Melanogaster; 2 years; $5,000

Brandeis University, Waltham, Mass.; Albert Kelner; Spontaneous Mutation in Bacteria; 3 years; $30,000

California Institute of Technology, Pasadena, Calif.; N. H. Horowitz; Genetic Studies on Enzyme Synthesis; 3 years; $76,800

University of California, Berkeley, Calif.; David F. Bish; Kinetic Synthesis and Role of Histones in Cell Division and Development; 2 years; $29,800

Spencer W. Brown; Nature and Evolution of Lecano-Diatomid Genetic Systems; 3 years; $50,800

Bernard O. Flinnern; Los Angeles; Genetic Studies With Dwarf Mutants of Zea Mays; 3 years; $61,500

Charles M. Riek, Davis; Cyto-Genetics of Tomato Species Hybrids; 4 years; $51,400

Richard W. Siegel, Los Angeles; Analyses of Hereditary Endosymbiosis and Mating Type Determination in Paramecium; 3 years; $27,200

Richard Snow; Davis; Chromosomal Rearri~ement in Two Species of Clarkia; 2 years; $7,800

David A. Rodgers and Gerald E. McClearn; Ethyl Alcohol Preference of Mice; 1 year; $10,000

G. Ledyar~ Stebbins, Davis; Developmental Genetics of Single Gene Differences in Barley; 2 years; $41,000

University of Chicago, Chicago, 111.; Edward D. Garber; Chromosomal and Genetic Homology in the Genus Cotinina; 3 years; $30,800

Hewson Swift; Cytotoxicological Study on Nucleo Acids; 3 years; $73,500

Children’s Cancer Research Foundation, Boston, Mass.; George Xergianis; Genetics and Cytology of the Chinese Hamster; 2 years; $50,000
**CITY OF HOPE MEDICAL CENTER, Duarte, Calif.: William D. Kaplan; Sterility Component of X-Ray and Chemically Induced Dominant Lethals in D. Melanogaster; 1 year; $9,100**

**COLUMBIA UNIVERSITY, New York, N.Y.: Francis J. Ryan; Mutation as a Macro-molecular Process; 2 years; $49,500**

**J. HERBERT TAYLOR, Genetic and Cytological Studies on the Genus Scilla; 1 year; $12,800**

**CORNELL UNIVERSITY, Ithaca, N.Y.: L. F. Randolph; New York State College of Agriculture; Cytogenetic Studies of Horticulture; and Crop Plants; 3 years; $22,000**

**Bruce Wallace; Studies on the Micro-growth of Neurospora Hyphae; 1 year; $3,300**

**DAWNBROOK COLLEGE, Marysville, N.H.: Raymond F. Bennett; Collection and Maintenance of Genetic Stocks; 3 years; $23,200**

**DUKE UNIVERSITY, Durham, N.C.; Lewis E. Anderson; Diminutive Chromosomes in Bryophytes; 2 years; $15,500**

**ELMIRA COLLEGE, Elmira, N.Y.; Ruth Z. Korman; Genetic Studies on Staphylococcus; 3 years; $21,300**

**EMORY UNIVERSITY, Atlanta, Ga.; William H. Murdy; Relationship Between Characters of Growth, Morphology and Cytology in Maize; 2 years; $24,500**

**Charles Ray, Jr.; Cytogenetic Studies of Tetrahymena Pyriformis; 2 years; $15,000**

**UNIVERSITY OF FLORIDA, Gainesville, Fla.; J. R. Edwardson and M. K. Corbett; The Nature of Cytologic Male Sterility in Higher Plants; 2 years; $24,500**

**FRANKLIN RANCH FOUNDATION FOR EDUCATION OF SAN FRANCISCO STATE COLLEGE, San Francisco, Calif.; Sarane T. Bowen; Genetic and Environmental Variation in Artemia; 2 years; $6,000**

**UNIVERSITY OF GEORGIA, Athens, Ga.; H. Branch Howe, Jr.; Genetic Studies on Mating Type in Neurospora Crassa; 2 years; $14,000**

**HARTWELL COLLEGE, Saltma, Calif.; James F. Wilson; Investigation of Certain Problems in the Biology of Neurospora; 3 years; $21,500**

**HARVARD UNIVERSITY, Cambridge, Mass.; R. F. Leavitt; Genetics of Chlamydomonas Reinhardt; 2 years; $10,700**

**Stephen R. Taub; Genetics of Mating Type Inheritance in Paramecium Aurelia; 2 years; $13,500**

**UNIVERSITY OF HAWAII, Honolulu, Hawaii; H. Kamei; Cytotaxonomy, Origin and Evolution of Orchid Species; 2 years; $18,000**

**UNIVERSITY OF ILLINOIS, Urbana, Ill.; Jerry Hirsch; Experimental Behavior Genetics; 2 years; $22,304**

**E. D. Patterson; Studies of Genetic and Chromosomal Tester Stocks of Maize; 3 years; $43,900**

**INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Stanley Zimmering; Modification of Abnormal Genetic Ratios; 3 years; $16,800**

**JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Herman M. Kalckar; Biochemical Genetics With Special Reference to Galactose; 3 years; $17,000**

**C. A. Thomas, S. R. Stetina, and P. E. Hartman; Mode of Replication of a Phage; 3 years; $59,900**

**C. A. Thomas; Infectivity of Chemically Degraded and Reconstituted Bacteriophage; 3 years; $28,500**

**Theodore R. F. Wright; Basement Membrane of the Embryonic Lethal in Drosophila; 2 years; $13,400**

**KANSAS STATE UNIVERSITY, Manhattan, Kans.; Abraham Eisenstaedt; Genetic Control of Protein Specificity in Fly Flesh; 2 years; $13,000**

**KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Herbert Parker Riley; Chromosome Studies in Haworthia and Other South African Plants; 2 years; $6,800**

**UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Roger D. Milkman; Analysis of a Polyspecific System in Drosophila Melanogaster; 2 years; $15,000**

**Robert R. Miller; Speciation in Poeciliid Fishes; 5 years; $28,400**

**UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Ralph E. Comstock; Linkage in Finite Cross-Fertilizing Populations; 3 years; $77,200**

**Joseph G. Gall; Some Structural and Chemical Features of Animal Cell Nuclei; 5 years; $49,300**

**James C. Underhill; Variation in Meristic Characters in Fishes; 2 years; $7,100**

**UNIVERSITY OF MISSOURI, Columbia, Mo.; E. H. Coe, Jr.; Unorthodox Inheritance in Melanogaster; 3 years; $14,500**

**E. R. Sears; Cytogenetic Studies With Polyploid Species of Wheat; 3 years; $46,800**

**NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N.C.; D. J. Zobel; Quantitative Genetic Studies in Lobolly Pine and Sweetgum; 5 years; $86,500**

**OHIO STATE UNIVERSITY RESEARCH FOUNDATION, Columbus, Ohio; William B. McIntosh; Comparative Genetics of the Dearmouse and the Laboratory Mouse; 2 years; $15,000**

**Henry L. Plance; The Nature of the Induction of Uncontrolled Growth by Specific Genes; 1 year; $9,300**

**OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Robert W. Long; Polyploidy and Subspeciation in the Helianthus Nuttallii Complex (Composite); 2 years; $3,700**

**UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; Carl P. Novitskii; Interference of Crossing Over in Drosophila Melanogaster; 2 years; $13,700**

**OREGON STATE COLLEGE, Corvallis, Oreg.; J. D. Mohler; Phenogenetic Analysis of Gene Action in Polygenic Systems; 2 years; $11,300**

**Robert M. Storm; Studies on Biological Characteristics and Taxogenetic Features of Rana Aurora and Rana Pretiosa; 1 year; $8,000**

**UNIVERSITY OF OREGON, Eugene, Oreg.; E. Novitskii; Genetics of Drosophila; 3 years; $104,900**

**Franklin W. Stahl; Growth, Mutation and Recombination in Bacteriophage; 3 years; $85,200**

**UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; Ellis Englesberg; Genetics and Physiology of the Diazwle Phenomenon; 4 years; $62,300**

**PRINCETON UNIVERSITY, Princeton, N.J.; Bruce M. Ederhart; Enzyme Activity in Neurospora Crassa; 3 years; $23,800**

**Purdue Research Foundation, Lafayette, Ind.; Oliver E. Nelson; Genetic Fine Structure of the Wa/wa Region in Maize; 2 years; $21,200**
<table>
<thead>
<tr>
<th>Institution</th>
<th>Department</th>
<th>Project Title</th>
<th>Duration</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Texas, Austin, Tex.</td>
<td>Richard M. M.</td>
<td>Implications of Symbolic Logic</td>
<td>1 year</td>
<td>$5,900</td>
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<tr>
<td>University of Wisconsin, Madison, Wis.</td>
<td>Erwin N. Hiebert</td>
<td>Studies in Nineteenth Century Chemistry</td>
<td>15 months</td>
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<tr>
<td>Robert C. Stauffer</td>
<td>Darwin and the Development of Ecology</td>
<td>15 months</td>
<td>$16,400</td>
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<tr>
<td>Yale University, New Haven, Conn.</td>
<td>Oystein Ore</td>
<td>Early History of Probability</td>
<td>1 year</td>
<td>$4,800</td>
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**MATHEMATICAL SCIENCES**

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<th>Department</th>
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<th>Duration</th>
<th>Support</th>
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<tr>
<td>American Mathematical Society, Providence, R.I.</td>
<td>John H. Curtis</td>
<td>Finite Groups</td>
<td>4 weeks</td>
<td>$35,500</td>
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<tr>
<td>Amherst College, Amherst, Mass.</td>
<td>Alfred W. Wilcox</td>
<td>Structure of Banach Algebras</td>
<td>1 year</td>
<td>$4,800</td>
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<tr>
<td>Brandeis University, Waltham, Mass.</td>
<td>Willard B. Wright</td>
<td>Evolution and Genetics</td>
<td>2 years</td>
<td>$14,200</td>
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<tr>
<td>R. S. Rivlin</td>
<td>Nonlinear Continuum Physics</td>
<td>2 years</td>
<td>$65,000</td>
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<tr>
<td>University of California, Berkeley, Calif.</td>
<td>Edwin B. Beekerman and John W. Green</td>
<td>Los Angeles</td>
<td>$27,900</td>
<td></td>
</tr>
<tr>
<td>Hans J. Breuerman</td>
<td>Several Complex Variables</td>
<td>2 years</td>
<td>$24,000</td>
<td></td>
</tr>
<tr>
<td>Shing-Shen Chern and Edwin H. Spanier</td>
<td>Algebraic Topology and Differential Geometry</td>
<td>2 years</td>
<td>$70,800</td>
<td></td>
</tr>
<tr>
<td>R. J. DeVogelaere</td>
<td>Boundary Value Problems</td>
<td>6 months</td>
<td>$4,500</td>
<td></td>
</tr>
<tr>
<td>Richard C. Gilbert</td>
<td>Properties of Manifolds</td>
<td>2 years</td>
<td>$45,000</td>
<td></td>
</tr>
<tr>
<td>Ernest G. Straus</td>
<td>Integer Valued Analytic Functions</td>
<td>2 years</td>
<td>$13,700</td>
<td></td>
</tr>
<tr>
<td>Charles J. Titus</td>
<td>Extensions by Interior Mappings</td>
<td>1 year</td>
<td>$3,000</td>
<td></td>
</tr>
<tr>
<td>Frantisek Wolf</td>
<td>Operator Theory</td>
<td>2 years</td>
<td>$55,000</td>
<td></td>
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<tr>
<td>Erwin H. Spanier</td>
<td>Properties of Manifolds</td>
<td>2 years</td>
<td>$45,000</td>
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<tr>
<td>Ernest G. Straus</td>
<td>Integer Valued Analytic Functions</td>
<td>2 years</td>
<td>$13,700</td>
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**HISTORY AND PHILOSOPHY OF SCIENCE**

<table>
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<tr>
<th>Institution</th>
<th>Department</th>
<th>Project Title</th>
<th>Duration</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augustana College, Rock Island, Ill.</td>
<td>Fritiof M. Fryxell</td>
<td>The Hayden Survey</td>
<td>1 year</td>
<td>$5,000</td>
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<tr>
<td>University of California, Berkeley Calif.</td>
<td>Ernest W. Adams</td>
<td>Foundations of Measurement</td>
<td>1 year</td>
<td>$4,000</td>
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<tr>
<td>Iowa State University of Science and Technology, Ames, Iowa</td>
<td>John C. Greene</td>
<td>American Science in the Age of Jefferson</td>
<td>2 years</td>
<td>$7,400</td>
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<tr>
<td>Lehigh University, Bethlehem, Pa.</td>
<td>Nicholas Recher</td>
<td>Arabic Contributions to Logic</td>
<td>2 years</td>
<td>$4,500</td>
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<tr>
<td>MacMurray College, Jacksonville, Ill.</td>
<td>Walter B. Hendrickson</td>
<td>Academics of Science in the Middle West</td>
<td>2 years</td>
<td>$2,500</td>
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<tr>
<td>University of Minnesota, Minneapolis, Minn.</td>
<td>Paul K. Feyrerabend</td>
<td>Minnesota Center for Philosophy of Science</td>
<td>1 year</td>
<td>$8,000</td>
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<tr>
<td>Oregon State University, Corvallis, Ore.</td>
<td>Henry R. Leonard, Jr.</td>
<td>Primitive Linear Algebra</td>
<td>1 year</td>
<td>$5,900</td>
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<tr>
<td>University of California, Berkeley, Calif.</td>
<td>Edwin B. Beekerman and John W. Green</td>
<td>Los Angeles</td>
<td>$27,900</td>
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<td>Shing-Shen Chern and Edwin H. Spanier</td>
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<td>2 years</td>
<td>$70,800</td>
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<td>R. J. DeVogelaere</td>
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<td>Properties of Manifolds</td>
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<td>Ernest G. Straus</td>
<td>Integer Valued Analytic Functions</td>
<td>2 years</td>
<td>$13,700</td>
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<tr>
<td>Frantisek Wolf</td>
<td>Operator Theory</td>
<td>2 years</td>
<td>$55,000</td>
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<tr>
<td>Carnegie Institute of Technology, Pittsburgh, Pa.</td>
<td>Morris H. DeGroot</td>
<td>Optimum Sequential Sampling Plans</td>
<td>2 years</td>
<td>$10,000</td>
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<tr>
<td>Henry S. Leonard, Jr.</td>
<td>Primitive Linear Groups</td>
<td>2 years</td>
<td>$10,200</td>
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<tr>
<td>Case Institute of Technology, Cleveland, Ohio</td>
<td>D. P. Eckman</td>
<td>Control Systems Computer</td>
<td>1 year</td>
<td>$90,000</td>
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<tr>
<td>Charles Salter</td>
<td>Finite Difference Operators</td>
<td>2 years</td>
<td>$12,800</td>
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CATHOLIC UNIVERSITY OF AMERICA, Washington, D.C.; Eugene Lukacs; Probability and Mathematical Statistics; 3 years; $48,000
UNIVERSITY OF CHICAGO, Chicago, Ill.; A. Adrian Albert; Research in Algebra; 3 years; $52,000
William H. Kruskal; Statistical Inference; 2 years; $42,400
Richard K. Lashof and Eldon Dyer; Algebra Topology and Convex Surfaces; 2 years; $44,900
G. C. Schilling; Investigations in Valuation Theory; 2 years; $5,800
Antoni Zygmund and Albert P. Calderon; Partial Differential Equations; 1 year; $5,000
Colorado School of Mines, Golden, Colo.; Raymond A. Jordan; Expansion of Computing Center (IBM 650); 1 year; $5,100
COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.; Elmer E. Remmert; Establishment of Computing Center (IBM 650); 3 years; $20,000
COLUMBIA UNIVERSITY, New York, N.Y.; Walter C. Strodt; Ordinary Differential Equations; 1 year; $12,200
CorNELL UNIVERSITY, Ithaca, N.Y.; W. H. J. Fuchs; General Function Theory and Analysis; 1 year; $26,500
Simon Kochen and A. Nerode; Mathematical Logic; 2 years; $37,300
Lionel Weiss; Nonparametric Statistical Methods; 2 years; $30,000
DALEMBERT COLLEGE, Hanover, N.H.; John G. Kemeny; Stochastic Processes; 2 years; $19,800
DICKINSON UNIVERSITY, Carlisle; Algebra and Number Theory; 2 years; $26,800
John H. Roberts; Topology; 2 years; $22,700
FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Nicholas Heereman; Power Series Ring; 15 months; $5,800
Paul J. McCarthy; Irreducibility of Polynomials; 15 months; $8,700
GEORGE WASHINGTON UNIVERSITY, Washington, D.C.; Robert S. Ledley; Installation of Electronic Computer; 1 year; $30,000
Georgetown University, Washington, D.C.; George J. Kazarinoff; Local Homology and Homotopy Theories; 3 years; $26,300
M. K. Fort, Jr.; Point Set Topology; 2 years; $21,000
R. P. Hunter; Continuous Associative Multiplications; 2 years; $5,400
Harvey Mudd College, Claremont, Calif.; Courtney S. Coleman; Ordinary Differential Equations; 2 years; $4,100
University of Hawaii, Honolulu, Hawaii; Robert W. Blatt; Establishment of a Computing Center (IBM 650); 1 year; $30,000
University of Illinois, Urbana, Ill.; M. M. Day; Functional Analysis; 2 years; $26,200
Alex Heller; Algebraic Topology; 2 years; $16,400
Michio Suzuki; The Structure of Finite Groups; 2 years; $30,800
A. H. Taub; Numerical Analysis and Applied Mathematics; 1 year; $36,400
R. A. Wijeshu, Colu Biju, D. L. Burchholder and D. M. Roberts; Sequential Decision Procedures; 2 years; $35,000
Herbert S. Wilf; The Stability Theory of Numerical Integration; 1 year; $2,300
INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Ernst Snapper, Birational Geometry; 2 years; $22,100
Louis Auslander; Subgroups of Lie Groups; 2 years; $31,500
William S. Gustin; Area Theory; 2 years; $18,000
F. R. Masetti; Stochastic Problems of Communication Theory; 2 years; $16,200
Andrew H. Wallace; Real Analytic Varieties; 2 years; $18,700
George Whaples; Algebraic Number Theory and Homological Algebra; 1 year; $7,300
KENTON COLLEGE, Gambier, Ohio; Otto M. Nikodym; Operators in Hilbert Space; 2 years; $18,900
LOUISIANA STATE UNIVERSITY, Baton Rouge, La.; Eugene V. Schenkman; Group Theory; 2 years; $18,400
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Pasquale Porcelli; Bounded Analytic Functions; 2 years; $12,700
UNIVERSITY OF MARYLAND, College Park, Md.; John W. Brace; Functional Analysis; 1 year; $6,400
R. E. Fullerton; Problems in Functional Analysis; 3 years; $58,600
James A. Hummel and Michael Zedek; Geometric Function Theory; 2 years; $26,700
Cecil R. Karp; Infinitary Formal Calculi; 2 years; $4,400
UNIVERSITY OF MIAMI, Coral Gables, Fla.; Paul M. Swingle; Nonlinear Connections and Calculus; 3 years; $20,700
MICHIGAN STATE UNIVERSITY, East Lansing, Mich.; Leo Katz; Discrete Methods in Mathematical Statistics; 2 years; $29,800
UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Arthur W. Burks; Theory of Automata; 2 years; $50,000
Nathaniel Courson; Hydrodynamics; 2 years; $19,000
Cecil C. Craig; Computing and Data Processing; 3 years; $150,000
Donald A. Darling; Functional Analysis and Stochastic Processes; 1 year; $9,800
Nicholas V. Kazarinoff; Scalar Scattering by Convex Bodies; 1 year; $11,000
Beaucour Dougall Biddulph; Product Spaces and Hilbert Space; 1 year; $8,000
Jack E. McLaughlin; Von Neumann and Frink Coordinates; 1 year; $11,700
UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Eugenio Calabi, Hidehiko Yamabe and W. W. Green; Structure of Manifolds; 2 years; $26,300
Bernard R. Gelbaum; Banach Algebras; 1 year; $12,500
UNIVERSITY OF MISSOURI, Columbia, Mo.; M. A. Basco; Establishment of a Computing Center (Burroughs 265); 1 year; $96,000
UNIVERSITY OF NEW HAMPSHIRE, Durham, N.H.; Robert H. Owens; Establishment of Computing Center (Recomb); 3 years; $50,000
UNIVERSITY OF TEXAS, Austin, Tex.; Forrest Cooparshone; Estimation of Convolution; 1 year; $11,700
NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANICAL ARTS, University Park, N. Mex.; George W. Gardner; Computing Time for Basic Research; 1 year; $5,900
NEW YORK UNIVERSITY, New York, N.Y.; Wilhelm Magnus; Combinatorial Group Theory; 2 years; $64,600
<table>
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<tr>
<th>Institution</th>
<th>Course/Degree</th>
<th>Duration</th>
<th>Amount</th>
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<tr>
<td>University of North Carolina, Chapel Hill, N.C.</td>
<td>F. Burton Jones: Classification of Plane Curves</td>
<td>2 years</td>
<td>$22,200</td>
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<td>University of Tennessee, Knoxville, Tenn.</td>
<td>Albert M. White: Theory of Functions and Functional Analysis</td>
<td>2 years</td>
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<tr>
<td>Teachers College, Columbia University, New York, N.Y.</td>
<td>Rosedith Sitgreesves: Classification Procedures</td>
<td>3 years</td>
<td>$22,900</td>
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<td>Washington University, St. Louis, Mo.</td>
<td>Allen Devlin: Spectral Problems in Harmonic Analysis</td>
<td>2 years</td>
<td>$24,100</td>
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<td>Pacific Union College, Angwin, Calif.</td>
<td>Donald C. Spencer: Differentiable Manifolds and Sheaves</td>
<td>1 year</td>
<td>$4,500</td>
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<td>Princeton University, Princeton, N.J.</td>
<td>John H. Stambaugh: Computing Center</td>
<td>3 years</td>
<td>$55,000</td>
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<td>University of Rochester, Rochester, N.Y.</td>
<td>Arthur H. Copeland: Groups of Mapping Classes</td>
<td>2 years</td>
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<tr>
<td>Rose Polytechnic Institute, Terre Haute, Ind.</td>
<td>J. DeGroot: Linearization of Mappings</td>
<td>2 months</td>
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<td>Charles B. Bell, Jr.: Distribution-Free Statistics</td>
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<td>Herman Friedman, Richard A. Peabody, and Charles Hurwitz: Mechanism of Action of Streptomycin</td>
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<td>Albany Medical College, Union University, Albany, N.Y.</td>
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<tr>
<td>American University of Beirut, Beirut, Lebanon</td>
<td>DNA Synthesis in Normal and Regenerating Livers</td>
<td>2 years</td>
<td>$8,300</td>
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<tr>
<td>Arizona State University, Waco, Tex.</td>
<td>Behavior of Enzymes at High Dilutions</td>
<td>2 years</td>
<td>$18,000</td>
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<tr>
<td>Boston University, Boston, Mass.</td>
<td>Metabolites of Isolated Tissues, Cells and Subcellular Functions</td>
<td>1 year</td>
<td>$18,000</td>
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<td>Brandeis University, Waltham, Mass.</td>
<td>Enzymatical Mechanisms Involved in Biosynthesis of Thymoglobin, A Glycoprotein</td>
<td>3 years</td>
<td>$44,200</td>
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<td>Brigham Young University, Provo, Utah</td>
<td>Studies on Metabolism of Thio- bacillus Ferrooxidans and Other Autotrophic Bacteria</td>
<td>2 years</td>
<td>$16,800</td>
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<td>University of California, Berkeley, Calif.</td>
<td>Rate of Flow of Carbon Through the Tricarboxylic Acid Cycle</td>
<td>2 years</td>
<td>$18,000</td>
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<tr>
<td>Roger Dave Dale, Davis</td>
<td>Protein Synthesis During Pregnancy</td>
<td>2 years</td>
<td>$15,200</td>
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<tr>
<td>S. S. Elberg</td>
<td>Intramonomocytic Metabolism of Brucella Melitensis in Cell Culture</td>
<td>2 years</td>
<td>$29,800</td>
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<tr>
<td>David M. Greenberg</td>
<td>Enzyme and Isotope Studies on One Carbon Metabolism and Metabolism of the Cell</td>
<td>3 years</td>
<td>$46,700</td>
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<tr>
<td>Max Kiebler, Davis</td>
<td>Synthesis of Aminocompounds by Intact Cells</td>
<td>2 years</td>
<td>$50,000</td>
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<tr>
<td>George G. Lattes, Los Angeles</td>
<td>Nature and Control of Cellular Development</td>
<td>3 years</td>
<td>$32,800</td>
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<tr>
<td>Allen G. Matt, Davis</td>
<td>Biochemical Cytology of Bacteriology</td>
<td>3 years</td>
<td>$35,000</td>
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<tr>
<td>R. Y. Stanier</td>
<td>Physiology and Biochemistry of Bacteriology</td>
<td>5 years</td>
<td>$113,000</td>
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<td>T. E. Weter and C. R. Stocking, Davis</td>
<td>Ultrastructure of Chloroplasts During Changes in Cell Metabolism and Isolation</td>
<td>3 years</td>
<td>$11,800</td>
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<tr>
<td>University of Chicago, Chicago, Ill.</td>
<td>Mechanism of Antibody Synthesis</td>
<td>3 years</td>
<td>$28,500</td>
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<tr>
<td>Wayne J. McIlraith</td>
<td>Physiological Functions of Boron in Plants</td>
<td>2 years</td>
<td>$15,000</td>
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<tr>
<td>University of Cincinnati, Cincinnati, Ohio</td>
<td>Streptolysin O and its Effects Upon Cellular Metabolism</td>
<td>1 year</td>
<td>$7,500</td>
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<tr>
<td>City of Hope Medical Center, Duarte, Calif.</td>
<td>Bioluminescence Produced by selected Fungi</td>
<td>2 years</td>
<td>$22,000</td>
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<tr>
<td>University of Oregon, Boulder, Colo.</td>
<td>Bioluminescence Produced by selected Fungi</td>
<td>2 years</td>
<td>$22,000</td>
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<td>Richard Thompson</td>
<td>Physiological Sequences in the Mitotic Cycle</td>
<td>2 years</td>
<td>$35,800</td>
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<tr>
<td>University of Colorado, Boulder, Colo.</td>
<td>Metabolic Sequences in the Mitotic Cycle</td>
<td>2 years</td>
<td>$35,800</td>
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<tr>
<td>Columbia University, New York, N.Y.</td>
<td>Biochemistry and Metabolism of Nicotinic Acid and Related Compounds in Nicotiana</td>
<td>3 years</td>
<td>$30,600</td>
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<tr>
<td>Philip Gelbloom</td>
<td>Induced Enzyme Formation in Mammalian Systems</td>
<td>2 years</td>
<td>$32,000</td>
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<tr>
<td>Connecticut Agricultural Experiment Station, New Haven, Conn.</td>
<td>Organic Acids in Leaves</td>
<td>2 years</td>
<td>$20,000</td>
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<tr>
<td>University of Connecticut, Storrs, Conn.</td>
<td>Identification and Metabolism of the Production of Volatile Substances Produced by Selected Fungi</td>
<td>2 years</td>
<td>$8,300</td>
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<tr>
<td>Cornell University, Ithaca, N.Y.</td>
<td>Specialized Laboratory Equipment Required in Research</td>
<td>1 year</td>
<td>$19,700</td>
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<tr>
<td>Elgin State Hospital, Elgin, Ill.</td>
<td>Bacterial Oxidation of N-Acetylglucosamine</td>
<td>2 years</td>
<td>$18,000</td>
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<tr>
<td>Florida State University, Tallahassee, Fl.</td>
<td>Instrumentation for Photobiological Research</td>
<td>1 year</td>
<td>$26,100</td>
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<td>University of Georgia, Athens, Ga.</td>
<td>Amino Acid Transport Systems</td>
<td>2 years</td>
<td>$34,000</td>
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<tr>
<td>M. J. Cornier</td>
<td>Mechanisms of Bioluminescence</td>
<td>2 years</td>
<td>$31,100</td>
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<tr>
<td>Robert C. Eagon</td>
<td>Biosynthesis of Bacterial Polysaccharides</td>
<td>2 years</td>
<td>$12,000</td>
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<tr>
<td>William J. Payne</td>
<td>Equipment for Research in Bacteriology</td>
<td>1 year</td>
<td>$14,000</td>
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<tr>
<td>Alfred W. Scott</td>
<td>Equipment to Support the Research Programs in Biochemistry</td>
<td>1 year</td>
<td>$20,000</td>
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<tr>
<td>Harvard University, Cambridge, Mass.</td>
<td>Amino-Acid Transport Systems</td>
<td>2 years</td>
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<tr>
<td>University of Illinois, Urbana, Ill.</td>
<td>Control of Amino Acid and Protein Metabolism in Adipose Tissue</td>
<td>2 years</td>
<td>$16,200</td>
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<tr>
<td>Albert E. Renold</td>
<td>Control of Amino Acid and Protein Metabolism in Adipose Tissue</td>
<td>2 years</td>
<td>$16,200</td>
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<tr>
<td>Robert C. Eagon</td>
<td>Biosynthesis of Bacterial Polysaccharides</td>
<td>2 years</td>
<td>$12,000</td>
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<tr>
<td>William H. Pearlman, Boston</td>
<td>Steroid Hormones: Studies Utilizing Radioisotopes</td>
<td>1 year</td>
<td>$11,100</td>
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<tr>
<td>Albert E. Renold</td>
<td>Control of Amino Acid and Protein Metabolism in Adipose Tissue</td>
<td>2 years</td>
<td>$22,000</td>
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<tr>
<td>T. Hastings Wilson</td>
<td>Cellular Uptake of Large Molecules by Intestinal Epithelium</td>
<td>4 years</td>
<td>$35,000</td>
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<td>Haskins Laboratories, New York, N.Y.</td>
<td>Heterotropic Growth of Euglena</td>
<td>2 years</td>
<td>$14,400</td>
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<td>Haverford College, Haverford, Pa.</td>
<td>Environmental-Induced Changes in Ribonucleic Acid of Bacteria</td>
<td>3 years</td>
<td>$21,000</td>
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<tr>
<td>University of Illinois, Urbana, Ill.</td>
<td>Hybrid Vigor in Corn</td>
<td>2 years</td>
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<td>Biotechnology, Ames, Iowa</td>
<td>Photochemical Research</td>
<td>1 year</td>
<td>$8,500</td>
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<td>Iowa State University of Science and Technology, Ames, Iowa</td>
<td>Respiratory Properties of Subcellular Particles of Fungi and Fungicide Action</td>
<td>1 year</td>
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<td>Kaiser Foundation Research Institute, Oakland, Calif.</td>
<td>Specific Factors in Enzyme and Protein Biosynthesis</td>
<td>1 year</td>
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<tr>
<td>Iowa State University of Science and Technology, Ames, Iowa</td>
<td>Respiratory Properties of Subcellular Particles of Fungi and Fungicide Action</td>
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<td>Institution</td>
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<td>Duration</td>
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<td>University of California, Los Angeles, Calif.</td>
<td>Optimization of Starch Metabolism into Protoplasts of Sarcoma Lutes</td>
<td>3 years</td>
<td>$20,000</td>
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<tr>
<td>Kansas State University, Manhattan, Kansas</td>
<td>Metabolism of Cholesterol in the Central Nervous System</td>
<td>2 years</td>
<td>$20,200</td>
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<tr>
<td>University of Kansas, Lawrence, Kansas</td>
<td>Biochemistry of Ricetides</td>
<td>2 years</td>
<td>$20,200</td>
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<td>Los Angeles State College Foundation, Los Angeles, Calif.</td>
<td>Amino Acid Incorporation Into Proteoplasts of Sarcoma Lutes</td>
<td>3 years</td>
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<td>Michael Reese Hospital and Medical Center, Ill.</td>
<td>Influence of Rate of Ingestion of Diet on Intermediary Metabolism</td>
<td>3 years</td>
<td>$30,000</td>
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<td>Michigan State University, East Lansing, Mich.</td>
<td>Bacterial Tricarboxylic Acid Cycle Enzyme Activities</td>
<td>3 years</td>
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<td>University of Michigan, Ann Arbor, Mich.</td>
<td>Biosynthesis of Desoxyribose</td>
<td>2 years</td>
<td>$24,000</td>
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<td>University of Minnesota, Minneapolis, Minn.</td>
<td>Enzyme Formation in Phage-Infected Bacteria</td>
<td>4 years</td>
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<td>University of Nebraska, Lincoln, Nebr.</td>
<td>Enzymatic Synthesis of Carbohydrates</td>
<td>2 years</td>
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<td>University of Southern California, Los Angeles, Calif.</td>
<td>Utilization of Amino Acid Amides by Normal and Virus Infected Tissue Culture Cells</td>
<td>1 year</td>
<td>$6,000</td>
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<tr>
<td>Ohio State University Research Foundation, Columbus, Ohio</td>
<td>Antibiotic Production During Sporogenesis</td>
<td>2 years</td>
<td>$15,000</td>
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<td>Oregon State College, Corvallis, Oreg.</td>
<td>Metabolism of Cholesterol</td>
<td>3 years</td>
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<td>Oregon State College, Corvallis, Oreg.</td>
<td>Metabolism of Cholesterol in the Central Nervous System</td>
<td>2 years</td>
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<td>University of Oregon, Eugene, Oreg.</td>
<td>Humoral Control of Metabolism in Crustaceans</td>
<td>2 years</td>
<td>$36,000</td>
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<td>Jacob Strauss; Synthesis of Anthocyanin in Corn Endosperm Tissue Cultures</td>
<td>3 years</td>
<td>$20,500</td>
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<td>Temple University, Philadelphia, Pa.; John M. Ward; Biochemical Aspects of Morphogenesis of the Silene Acid</td>
<td>2 years</td>
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<td>University of Tennessee, Knoxville, Tenn.</td>
<td>Enzyme Activities</td>
<td>2 years</td>
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<td>University of Texas, Austin, Tex.; James L. Larimer; Gas Secretion and Carbonic Anhydrase</td>
<td>2 years</td>
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<td>Purdue Research Foundation, Lafayette, Ind.</td>
<td>Biosynthesis of Carotenoids in the Tomato</td>
<td>2 years</td>
<td>$18,000</td>
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<td>Rutgers, The State University, New Brunswick, N.J.; J. Oliver Lamped; Action of Fungal Activities in Yeast</td>
<td>3 years</td>
<td>$90,000</td>
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<td>Saint Louis University School of Medicine, St. Louis, Mo.; Eljah Adams; Enzymatic Degradation of Pharmacologically Active Compounds</td>
<td>2 years</td>
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<td>University of Wisconsin, Madison, Wis.</td>
<td>Synthesis of Lignins in Plants</td>
<td>2 years</td>
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| 196
Howard Gent; Comparatives (Biochemistry) and Utah State University, Logan, Utah
Vanderbilt University, Nashville, Tenn.; Sidney P. Colowick; Control of Carbohydrate Metabolism; 2 years; $12,500
University of Washington, Washington, D.C.; Ruth G. Wittier; Metabolic Factors Required to Promote Reversion of Mycoplasma Mycoides to Bacterial Form; 4 months; $5,300
Virginia Polytechnic Institute, Blacksburg, Va.; C. J. Ackerman; Cytotoxic Com- synergists in the Biosynthesis of Choline; 2 years; $70,000
University of Wisconsin, Madison, Wis.; Howard K. Schachman; Determinants of RNA Polymerase Activity in E. coli and Related Bacterial Systems; 3 years; $95,000
Vanderbilt University, Nashville, Tenn.; George W. Welkie; Reactions of Plasma Yodoide to Bacteriophage; 4 years; $12,500
University of Berlin, Berlin, Germany; C. J. Ackerman; Control of Urephoradic enzyme in the Biosynthesis of Choline; 2 years; $10,000
University of Illinois, Chicago, Ill.; H. McShan; Characterization of the Cytochrome Oxidase of Mammalian Tissues; 3 years; $31,100
Warwick Sakurai; Methyl Group Metabolism in Animals; 3 years; $42,800
University of Wisconsin, Madison, Wis.; Paul J. Allen; Relation of Metabolic Processes to the Development of Parasitic Fungi; 2 years; $20,000
Robert M. Burk and Marilyn H. Halvorson; Protein Biosynthesis at the Template Level; 3 years; $70,000
Dexter S. Goldman; Fatty Acid Metabolism of the Tubercle Bacillus; 3 years; $30,000
W. H. McShan; Characteristics of Particulates Isolated From Anterior Pituitary Tissue; 2 years; $31,000
P. W. Wilson and R. H. Burris; Biological Fixation of Nitrogen; 3 years; $35,000
Worcester Foundation for Experimental Biology, Inc., Shrewsbury, Mass.; Oscar Hechter; Mode of Action of Insulin Upon Permeability Processes in Muscle Fibers; 2 years; $30,000
David Stone; The Influence of Nucleic Acid Metabolism on Animal Cells in Culture; 1 year; $15,000
Yale University, New Haven, Conn.; John A. Demoss; Genetic and Physiological Control of Cellular Structures; 3 years; $30,000
Arthur W. Galston; Mechanism of Action of Hormones and Visible Radiation in the Control of Plant Cell Growth; 4 years; $73,500
William S. Hillman; Control of Growth and Flowering in the Lupines; 3 years; $44,700
Yeshiva University, New York, N.Y.; Elsa Prosh Paulsen; C2, and C3, Steroid Synthesis in the Adrenal Gland; 3 years; $31,100
Harold J. Strecker; Interconversion of Glutamine Acid and Proline; 3 years; $21,000

MOLECULAR BIOLOGY

University of Arizona, Tucson, Ariz.; Albert Siegel; The Relationship Between Ribonucleic Acid and Protein; 5 years; $95,000
Ralph W. G. Wyckoff; Morphology and Composition of Macromolecules; 3 years; $90,000
Bertol Research Foundation of the Franklin Institute, Swarthmore, Pa.; William C. Denison; Some Luminescence of Chlorophyll in Vivo and in vitro; 1 year; $12,900
University of Birmingham, Birmingham, England; H. Mueller and S. V. Perry; Protein Synthesis in Muscle; 2 years; $12,000
University of Wisconsin, Madison, Wis.; Nathan O. Kaplan and Saul G. Cohen; Relation Between Structure and Function in Metalloenzymes; 1 year; $50,000
Harold P. Klein; Hydrocarbons and Related Compounds of Saccharomyces Cerevisiae; 2 years; $10,000
Richard S. Morgan; Structure of the Microsomal Particle and Related Ribonucleic Acids; 2 years; $18,000
California Institute of Technology, Pasadena, Calif.; Robert B. Corey and Linus Pauling; Structure of Proteins; 3 years; $300,000
University of California, Berkeley, Calif.; James Caron; Nonantibiotic Metabolic Products of Bacterial Growth; 3 years; $21,000
University of California, Berkeley, Calif.; William G. Clark, Los Angeles; Mammalian Histidase Decarboxylase; 2 years; $24,000
Helga L. Freinkel-Conrat; Chemical Nature of Physiologically Active Ribonucleic Acid; 3 years; $100,000
Howard K. Schachman; Macromolecules of Biological Interest; 5 years; $170,000
University of Chicago, Chicago, Ill.; H. Burr Steinbach; Intracellular Ion Distribution and Function; 3 years; $41,800
Birgit Vennesland; Chloroplast Reactions; 5 years; $95,000
Children's Hospital of Buffalo, Buffalo, N.Y.; R. J. Martinez; Reactions of Bacteria; 2 years; $7,000
University of Cincinnati, Cincinnati, Ohio; Richard A. Day; Secondary and Tertiary Structure of Proteins; 2 years; $9,000
College of Charleston, Charleston, S.C.; Joseph R. Merkoli; Metal-Regulated, Photocatalytic Reactions of Flavin Systems; 2 years; $9,000
Columbia University, New York, N.Y.; Sam M. Beeler, and Frederick Agate; Properties of Steroid Hormone-Protein Conjugates; 3 years; $61,200
Reinhold Benesich; Modification of Proteins; 4 years; $75,000
Irving Goodman; Determinants of Biological Action; 2 years; $36,000
Alvin L. Krasna; The Role of the Enzyme Hydrolyase in Hydrogen Photosynthesis; 2 years; $16,000
Barbara W. Low; X-Ray Crystal Structure Studies of Insulin; 3 years; $50,000
Stanley L. Miller; Mechanisms for the Synthesis of Organic Compounds on the Primitive Earth; 2 years; $19,000
David Nachmanson; Molecular Forces in Nerve Impulse Conduction; 5 years; $120,000
Stephen Zamenhof; Studies on the Biochemistry of Polyphosphates; 1 year; $11,000
Cornell University, Ithaca, N.Y.; George P. Hess; Structural and Functional Interrelationships in Enzymes; 1 year; $19,000
Robert H. Holley; Fractionation and Characterization of Ribonucleic Acid; 3 years; $22,000
J. R. Vallentyne: Ecological and Biogeochemical Studies of Amino Acids and Polypeptides; 3 years; $46,000

Dartmouth College, Hanover, N.H.: Shinya Inoue; Analysis of Fine Structure of Living Cells; 3 years; $210,000

Manuel F. Morales; Configuration of Dissolved Proteins and Protein Models; 5 years; $31,500

Arthur J. Samuels; Immuno-Enzymology of Muscle Proteins; 2 years; $11,000

Lucile Smith; Oxidative Phosphorylation in Heart and Bacterial Particles; 1 year; $5,000

Earlham College, Richmond, Ind.: William K. Stephenson; Alcohol Penetration into Living Cells; 2 years; $13,300

Emory University, Atlanta, Ga.: John M. Reiner; Mechanism of Injection and Multiplication of Bacterial Viruses; 2 years; $14,000

Hahnemann Medical College, Philadelphia, Pa.: Peter Gersper; Competitive Inhibitors for 3-Diphosphoglycerate; 2 years; $14,000

Harvard University, Cambridge, Mass.: Konrad Bloch; The Mechanism of Synthesis of Steroids in Biological Systems; 3 years; $50,000

Oleg Jardetsky; Nuclear Magnetic Resonance Studies of Biologically Important Molecules; 2 years; $73,000

John H. Law; Biochemistry of the Glycolipides; 2 years; $11,000

A. K. Solomon; Permeability of Cellular Membranes; 3 years; $81,000

George Wald; Research on Biochemistry of Vision; 4 years; $32,000

James D. Watson; Structure and Function of Bacterial Micromesomes; 3 years; $100,000

Health Research, Inc., Buffalo, N.Y.: David Harker; Crystal Structure of Ribonuclease; 1 year; $25,000

University of Illinois, Urbana, Ill.: S. Spiegelman; The Mechanism of Enzyme Synthesis; 5 years; $90,000

Institute for Cancer Research, Philadelphia, Pa.: Thomas F. Anderson; Invasion of Host Cells by Bacterial Viruses; 2 years; $23,000

Thomas F. Anderson; Specific Synthesis in Bacteria and Bacteriophages; 3 years; $159,000

Iowa State University of Science and Technology, Ames, Iowa: S. Aronoff; Interorgan Movements of Organic Compounds; 2 years; $22,000

David A. Metzler; Mechanism of the Catalytic Action of Ribonuclease; 3 years; $22,100

Johann-Wolfgang-Goethe Universitat, Frankfurt/Main, West Germany: Erich Hediger; Chemical and Physico-Chemical Basis of Active Transport; 2 years; $22,000

Johns Hopkins University, Baltimore, Md.; Michael Beer; Electron Microscope Studies of Macromolecules and Cells; 1 year; $60,000

Thomas C. Bruice; Synthesis of a Series of Quinone Acceptor-Ligand Compounds; 4 years; $86,500

Kansas Wesleyan University, Salina, Kan.: Orville L. Vooh; Interactions of Toxopheral with Proteins and Amino Acids; 5 years; $37,000

Kentucky Research Foundation, Lexington, Ky.: Richard S. Schweet; Incorporation of Amino Acids into Ribonucleic Acid; 18 months; $20,100

Kyoto University, Miasu, Japan: Hiroshi Fujita; Differential Equation for the Ultraconservative System; 1 year; $1,500

University of Maine, Orono, Maine: George R. Pettit; Alkaloid and Triterpene Components of the Labrador Tea; 2 years; $8,000

Manhattan College, New York, N.Y.: Brother William Batt; Lipase Purification and Related Research; 2 years; $20,000

Marine Biological Laboratory, Woods Hole, Mass.; Morris Rockstein; Biochemical Basis for Light Orientation of the Starfish of the Woods Hole Area; 5 years; $32,900

University of Maryland, College Park, Md.: R. G. Grenell, The Psychiatric Institute; The Structure of Brain Lipid-Protein Complexes; 1 year; $7,000

Harris J. Linder; Histochcmistry of Cocoon and Egg Shell Formation; 2 years; $10,000

Massachusetts General Hospital, Boston, Mass.; Jerome Gross; Interorganizational Organization and Interactions of Normal and Abnormal Collagens; 1 year; $20,000

Massachusetts Institute of Technology, Cambridge, Mass.: Vernon C. A. K. Solomon; Permeability of Cellular Membranes; 3 years; $56,000

Bosch Magasanik; Regulation of the Metabolic Processes at the Molecular Level; 2 years; $18,000

Alexander Rich; Molecular Structural Studies on the Nucleic Acids and Related Compounds; 3 years; $75,000

University of Michigan, Ann Arbor, Mich.: M. J. Coon; Biological Hydrocarbon Oxidation; 3 years; $52,000

University of Minnesota, Minneapolis, Minn.; Rufus Lymy; Kinetic Studies of Enzyme Mechanisms; 2 years; $25,000

Fred Smith; Detailed Structure of Poly saccharides; 4 years; $35,000

University of Missouri, Columbia, Mo.: Owen J. Kopepe; Mechanism of Action of Glyceroldehyde-3-Phosphate Dehydrogenases; 3 years; $22,000

Mount Holyoke College, South Hadley, Mass.; Jytte Muus; Chemical and Enzymatic Studies on Human Salivary Amylase; 3 years; $33,000

Curtis G. Smith; Inhibition of Ribofavin Synthesis in Bremothecium Abbotii; 2 years; $18,800

National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.: Hugo Beyer; Analysis of Identification of Products of Histidine Metabolism; 2 years; $8,000

New York University, New York, N.Y.: John S. Cook; Bphytrocule Volume and Melting Points of the Alkaloids of Monovalent Anions; 21 months; $12,600

C. T. O. Fong; Chemical Aspects of Hormone-Receptor Interaction; 1 year; $13,000

Robert C. Warner; Physical Properties of Enzymatically Synthesized Polynucleotides and DNA Synthesis; 3 years; $51,000

Robert Warner Chambers; Synthesis of Nucleotides; 3 years; $36,000

University of North Carolina, Chapel Hill, N.C.; Claude Plantadosi; Chemistry and Metabolism of Plasmalogens; 2 years; $14,000

University of Pennsylvania, Philadelphia, Pa.; Britton Chance; Experimental Studies
on Energy Transfer and Conservation; 5 years; $70,000
Mildred Cohn; Mechanisms of Phosphorylation and Phosphate Transfer Reactions; 2 years; $28,000
R. E. Forster; Diffusion of Gases and Their Simultaneous Chemical Reaction With Hemoglobin; 2 years; $20,000
George F. Springer and William Pepper; Nature of Food Group Active Substances; 4 years; $40,000
Elisabeth Thorogood; Leguma Hemoproteins; 1 year; $11,000
Pomson University, Princeton, N.J.; Francis Comstock; Biochemistry of Luminescent Systems; 3 years; $42,000
W. J. Kausmann and J. B. Fresco; Physical-Chemical Investigations of Biological Macromolecules; 1 year; $70,000
Walker; Function of State University of New York, Albany, N.Y.; MArtynas Ye and Walter S. Vincent; Information Transfer Via Ribonucleic Acid; 3 years; $42,000
Reynolds, Boston, Mass.; Tovard Laurent; Interaction Between Concentrated Solutions of Hyaluronic Acid and Other Macromolecules; 2 years; $24,000
Rockefeller Institute, New York, N.Y.; Edward J. Murphy; Electrical Conduction in Hydrogen-Bonded Substances; 1 year; $8,000
Edward L. Tatum and Curtis A. Williams, Jr.; Effects of Gene Mutation of Proteins of Neurospora Crassa; 3 years; $65,200
Rutgers, The State University, New Brunswick, N.J.; G. S. Pansan and C. E. West; Liquid Thermal Diffusion of Natural Products; 2 years; $9,800
David Pramer; Concentration and Characterization of Nemin; 2 years; $18,000
Saint Mary's Hospital Medical School, Paddington, London, England; R. R. Porter; Receptor System of the Immunological Activity of Antibodies and Protein Antigens; 5 years; $100,000
State University of Iowa, Iowa City, Iowa; George Kalitsky and John P. Hummel; Character of the Catalytic Site of Ribonuclease; 3 years; $52,100
Temple University, Philadelphia, Pa.; Peter S. Olmsted; Mechanism of In Vitro Polynucleotide Synthesis; 2 years; $20,000
Texas A & M Research Foundation, College Station, Tex.; H. K. Zimmerman and Hans Weldman; Fundamental Chemistry of Aminosugars; 1 year; $7,700
University of Texas, Austin, Tex.; Lester Packr; Function of Subcellular Membranes; 2 years; $24,000
Austen F. Riggs; Biochemistry of Hemoglobin and of Nitrogen Fixation; 3 years; $30,000
Trinity College, Hartford, Conn.; W. Scott Worrall; Hypothesis on Intimate Mechanism of Proteolytic Enzymes; 3 years; $12,300
Tuskegee Institute, Tuskegee, Ala.; Horace D. Graham; Determination and Reactions of Food Gums; 1 year; $5,000
Vanderbilt University, Nashville, Tenn.; Leon W. Cunningham; Chemical and Enzymatic Studies of Glycopeptides; 3 years; $21,000
Virginia Institute for Scientific Research, Richmond, Va.; Lester J. Hye; Fiber and Ultrastructure Research; 2 years; $51,000
University of Virginia, Charlottesville, Va.; Robert B. Martin; Equilibrium and Kinetic Studies of Systems of Biological Interest; 2 years; $15,000
Wake Forest College, Winston-Salem, N.C.; Frank H. Neuberger; Cytochrome f in Photosynthesis; 2 years; $18,000
Washington State University, Pullman, Wash.; Leonard B. Kirchner; Osmotic Regulation and the Function of Regulatory Organs; 4 years; $31,900
Washington University, Saint Louis, Mo.; David Lipton; The Chemistry of Nucleic Acids and Related Substances; 4 years; $80,500
Midred Cohn; Mechanisms of Phosphorylation and Phosphate Transfer Reactions; 3 years; $39,000
Barry Commoner; Molecular Basis of the Biological Properties of Tobacco Mosaic Virus; 3 years; $170,000
Robert K. Crane; Utilization of Heteroacyl Acceptor by Animal Cells; 2 years; $31,300
Tung-Yue Wang; Globulin Fraction of Cell Nuclei; 2 years; $17,000
Wayne State University, Detroit, Mich.; Maurice H. Bernstein; Functional Modifications of Sperm Structure; 2 years; $39,000
Western Reserve University, Cleveland, Ohio; John Spilsbee; Fractionation of Desoxyribonucleic Acid; 1 year; $1,500
Yale University, New Haven, Conn.; Charles W. N. Lanyon; University of Wisconsin, Madison, Wis.; Philip P. Cohen and G. W. Brown, Jr.; Comparative Biochemistry of Urea Biosynthesis; 2 years; $27,000
Robert W. Fulton and Robert J. Shepard; Technique for Purification of Unstable Plant Viruses; 3 years; $23,000
Stephen A. Knoh and Henry A. Lardy; Enzyme Kinetics and Mechanisms; 1 year; $70,000
Yale University, New Haven, Conn.; Henry W. Hardby; Interactive Effects in Home and Flavin Systems; 3 years; $39,200
Patricia F. Knight; Oathespin Specificity and Antibody Formation; 2 years; $15,000
Frederic M. Richards; Relation of Structure to Function in Ribonuclease; 4 years; $57,200
Julian M. Sturtevant; Physico-Chemical Studies of Proteins and Related Reactions; 3 years; $45,000
Yeshiva University, New York, N.Y.; Shasha Elkind; The Structural Nature of Male Dehydrogenase; 2 years; $17,000
Nathar W. Penn; Nature and Role of the Mitochondrial Acceptor Fraction in Protein Metabolism; 2 years; $14,000
PHYSICS
Adelphi College, Garden City, N.Y.; Henry Brysk; An Asymptotic Formulation in the Theory of Scattering; 2 years; $9,100
University of Alabama, University, Ala.; Charles H. Mandeville; Structure of Nuclei; 2 years; $38,000
American University of Beirut, Beirut, Lebanon; Frans Bruni; Paramagnetic Resonance of Free Radicals; 3 years; $9,400
Bowdoin College, Brunswick, Maine; Robert H. Romer; Nuclear Spin Resonance in Helium Solutions; 3 years; $21,500
Boston University, Boston, Mass.; Edward Booth; Nuclear Resonance Scattering of Bremsstrahlung; 1 year; $17,500
Bowdoin College, Brunswick, Maine; Myron A. Jeppesen; Photoelectric Emission from Small Particles in Pulsed Light; 2 years; $26,800

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Walter D. Jones; Semiempirical calculation of Molecular Parameters; 2 years; $7,000

Branford University, Waltham, Mass.; Max Chetlen; Bubble Chamber Research on Elementary Particles; 2 years; $25,100

Babson Young University, Provo, Utah; Harvey Fletcher; Musical Acoustics; 2 years; $45,400

John H. Gardner; Gyrornagnetic Ratio of the Free Electron; 1 year; $9,100

John H. Gardner; Electron Paramagnetic Resonance at Very High Pressures; 3 years; $93,700

Brown University, Providence, R.I.; Philip L. Bransky; Nuclear Magnetic Resonance Studies of Molecular and Ionic Crystals; 3 years; $26,800

California Institute of Technology, Pasadena, Calif.; Jesse W. M. Duund and Harry A. Kitckpatrick; Precision Comparison of the X-ray Wavelength Scales; 1 year; $16,700

John R. Pellam; Properties of Matter at Low Temperatures; 2 years; $214,100

University of California, Berkeley, Calif.; Paul H. Barrett, Santa Barbara; Large Air Shower Detector; 1 year; $6,200

Carnegie Institute of Technology, Pittsburgh, Pa.; S. A. Fliedberg; Investigations in Low Temperature Physics; 2 years; $21,500

Robert T. Schumacher; Magnetic Resonance and Electronic Properties of Solids; 2 years; $33,900

Catholic University of America, Washington, D.C.; James G. Brennan; Interaction of Mu Mesons With Nuclei; 2 years; $12,000

Karl F. Herzel; Spectrographic Study of Neutron Production Processes; 2 years; $46,000

University of Chicago, Chicago, Ill.; Clayton F. Giese; Molecular Beam Experiments; 2 years; $37,300

A. W. Lawson and Morrel H. Cohen; Solid State Investigations; 3 years; $124,300

Robert S. Mulliken and C. C. J. Roothaan; Quantum Mechanical Studies on Molecular Structures; $206,800

R. W. Thompson; Double Cloud Chamber for High Energy Particles; 3 years; $210,600

City College, New York, N.Y.; Harry Lutjting; Theoretical Analysis of Nuclear Reaction Data; 1 year; $8,400

Colby College, Waterville, Maine; Dennison Bancroft; Precision Measurement of the Velocity of Sound in Gases; 2 years; $11,500

College of Puget Sound, Tacoma, Wash.; Martin E. Nelson; Primary Cosmic Rays; 2 years; $15,400

University of Colorado, Boulder, Colo.; Albert A. Bartlett; Beta-Ray Spectroscopy; 2 years; $39,300

Wesley E. Brittin; Research in Theoretical Physics; 2 years; $42,200

University of Connecticut, Storrs, Conn.; Arnold Russek; Theory of High-Energy Atomic Collisions; 2 years; $29,500

Cornell University, Ithaca, N.Y.; David M. Lee; Helium Solutions at Low Temperatures; 2 years; $55,800

Jay Orear; Scattering of Muons by Nuclei; 2 years; $99,400

L. G. Parratt; X-ray Spectroscopy; 2 years; $64,900

Dartmouth College, Hanover, N.H.; William T. Doyle; Color Centers in Ionic Crystals; 2 years; $45,700

University of Denver, Denver, Colo.; Byron E. Cohn; Maintenance of the Inter-University High Altitude Laboratories; 3 years; $15,600

DePauW University, Greencastle, Ind.; Malcom C. Lake; Solar Magnetic Fields; 3 years; $25,100

Duke University, Durham, N.C.; Horst Meyer; Thermal and Magnetic Properties at Low Temperatures; 2 years; $48,200

Florida State University, Tallahassee, Fla.; Harry Hail; Investigations in Elementary Particle Phenomena; 2 years; $41,500

Joseph L. Lannutti; High Energy Nuclear Physics; 2 years; $51,000

University of Florida, Gainesville, Fla.; Thomas A. Scott; Cryogenic Investigations at High Pressures; 2 years; $50,900

Fordham University, New York, N.Y.; Joseph F. Mulligan, Alfonso Weber, Joseph Shapiro, and Frederick L. Canavan; Theoretical and Mechanistic Physics Research Using a Computer; 3 years; $61,900

Franklin Institute, Philadelphia, Pa.; Franz R. Metzger; Resonance Fluorescence Studies Using the Centrifuge Method; 3 years; $117,900

Georgia Institute of Technology, Atlanta, Ga.; James R. Stevenson; Photoelastic Phenomena in Insulators; 2 years; $12,400

University of Georgia, Athens, Ga.; Malcolm F. Steuer, and Lewis C. Thompson; Nuclear Structure; 1 year; $85,800

Goucher College, Baltimore, Md.; John L. Lodge; Interactions of Elementary Particles; 2 years; $8,800

Harvard University, Cambridge, Mass.; Francis M. Pipkin; Measurement of Nuclear Magnetic Moments and Other Properties; 2 years; $27,200

Norman F. Ramsey; Molecular Beam Studies; 3 years; $90,000

Haverford College, Haverford, Pa.; Ray Aldenberg-Selove; Neutron Spectra and Energy Levels of Light Nuclei; 3 years; $47,200

Howard University, Washington, D.C.; Erwin M. Horl; Structure Studies of Solidification Permanent Gases; 2 years; $43,900

Illinois Institute of Technology, Chicago, Ill.; Thomas Erber; Bremsstrahlung and Pair Production at High Energies; 2 years; $15,400

Leonard I. Grossweiner; Electron Density Effects in Semiconductors; 2 years; $22,000

University of Illinois, Urbana, Ill.; Frederick Seltz; Theoretical Studies of Crystalline Materials; 2 years; $35,100

Indiana University Foundation, Bloomington, Ind.; E. J. Konopinski; The Theory and Interpretation of Elementary Particle Interactions; 2 years; $105,100

Institute for Advanced Study, Princeton, N.J.; Robert Oppenheimer; Theoretical Physics; 3 years; $150,000

Johns Hopkins University, Baltimore, Md.; Joseph D. Brown; Spectroscopy of Solids; 2 years; $15,700

Louisiana State University and Agricultural and Mechanical College, Baton Rouge; Walter G. Meier; Electron Spectroscopy; 2 years; $45,700

University of Michigan, Ann Arbor, Mich.; Frank J. Loeb; Nuclear Physics; 2 years; $35,800

University of Minnesota, Minneapolis, Minn.; Robert E. Schmitt; Theoretical Physics; 2 years; $32,600

University of Missouri, Columbia, Mo.; Harry A. Meyer; Condensed Phase Processes; 2 years; $25,000

University of Nebraska, Lincoln, Nebr.; Charles F. Goldhaber; Magnetic Fields and Nuclear Reactions; 2 years; $42,000

University of New Mexico, Albuquerque, N.M.; Robert W. Faust; Theoretical Physics; 2 years; $27,200

University of North Carolina, Chapel Hill, N.C.; John E. Ross; Theoretical Physics; 2 years; $25,700

University of North Dakota, Grand Forks, N.D.; John D. Nelson; Nuclear Physics; 2 years; $27,100

University of Oklahoma, Norman, Okla.; John D. R. Miller; Theoretical Physics; 2 years; $25,200

University of Oregon, Eugene, Ore.; William C. Bell; Nuclear Physics; 2 years; $27,500

University of Pennsylvania, Philadelphia, Pa.; Francis A. Miller; X-ray Spectroscopy; 2 years; $27,200

University of Rochester, Rochester, N.Y.; Edward C. Leggett; Nuclear Physics; 2 years; $25,300

University of Southern California, Los Angeles, Calif.; Leonard L. Schiff; Theoretical Physics; 2 years; $27,700

University of Texas, Austin, Tex.; John H. Haiden; Atomic Physics; 2 years; $25,800

University of Wisconsin, Madison, Wis.; Alfred M. Wohl; Nuclear Physics; 2 years; $25,200

Washington University, St. Louis, Mo.; Frank J. Loeb; Nuclear Physics; 2 years; $25,200

Yale University, New Haven, Conn.; Israel Rabi; Nuclear Physics; 2 years; $25,200

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Arthur Barkow: Elementary Particle Reactions inPhotographic Emulsions; 2 years; $15,500

Pennsylvania State University, University Park, Pa.; Edwin R. Fitzgerald; Dynamic Properties of Metals; 2 years; $23,800

Walter L. Goldberg: Nuclear Magnetic Resonance Studies; 2 years; $20,700

D. H. Rank; Precision Infrared Spectroscopy; 3 years; $60,100

University of Pennsylvania, Philadelphia, Pa.; C. W. Ufford; Theoretical Problems in Atomic and Nuclear Spectroscopy; 2 years; $61,400

University of Pittsburgh, Pittsburgh, Pa.; Manfred A. Biondi, Gerald Chalmers and Myron F. Garfunkel; Low Temperature Studies of Metals; 2 years; $86,700

Bernard L. Cohen; Nuclear Structure and Nuclear Reactions; 2 years; $121,500

C. Dean and G. A. Jeffrey; Crystal and Molecular Structures; 2 years; $18,700

Portland State College, Portland, Oreg.; Laird C. Brodie; Impurity Effects on Oscillatory Properties; 2 years; $14,300

Purdue Research Foundation, Lafayette, Ind.; Kenneth Andrew; Secondary Standards in High Precision Spectroscopy; 30 months; $18,400

Frederick J. Bellinante; Field Theory and Elementary Particles; 3 years; $25,100

Robert E. McDaniel; Investigation of the Structure of Metals; 2 years; $14,300

University of Rochester, Rochester, N.Y.; C. G. Shull; Optical Properties of Silver and Thallium Halides; 3 years; $18,900

Rensselaer Polytechnic Institute, Troy, N.Y.; Lionel G. Bibler; Determination of Molecular Structures; 3 years; $44,400

R. W. Stanley; Primary Standards and High Precision Spectroscopy; 30 months; $18,400

Portland College, Portland, Oreg.; Robert L. Martin; Optical Properties of Silver and Thallium Halides; 3 years; $18,900

University of South Carolina, Columbia, S.C.; Ernest Breitenberger; Multiple Scat-
tering as a Random Flight Process; 2 years; $20,600
Ronald D. Edge: Cosmic Ray Neutrons Near the Earth's Surface; 1 year; $18,500
SOUTH DAKOTA STATE COLLEGE, Brookings, S. Dak.; George H. Duffey: Application of Quantum Mechanics to Chemical Bonding; 2 years; $16,000
SOUTHERN METHODIST UNIVERSITY, Dallas, Texas; Clifton B. Clark; Specific Heat of Metals; 2 years; $12,500
SUNY, Stony Brook, N.Y.; William F. Hackett: Quantum Effects in Liquid and Solid Helium; 2 years; $96,700
Walter E. Mayerhoff: Nuclear Structure Research with 3 Mev Particles; 2 years; $6,700
George E. Pake: Antiferromagnetic Lambda Points in Paramagnetic Organic Compounds; 2 years; $29,500
STEVEINS INSTITUTE OF TECHNOLOGY, Hoboken, N.J.; Hans Meissner; Studies of Superconductivity; 2 years; $25,100
SWARTHMORE COLLEGE, Swarthmore, Pa.; Irving E. Dayton; Excitation Functions for Molecular Spectra; 2 years; $18,400
SYRACUSE UNIVERSITY RESEARCH INSTITUTE, Syracuse, N.Y.; Peter G. Bergmann and Arthur Komar; Observables in General Relativity; 3 years; $64,200
Nahum Horwitz; Properties of K-Metas; 1 year; $17,600
Erlich M. Hart and Jack Leitner; Development of a Fast-Flying Bubble Chamber; 3 years; $114,900
TEXAS TECHNICAL COLLEGE, Lubbock, Texas; Henry C. Thomas; Inner Bremsstrahlung in Electron Capture; 2 years; $11,600
TEXAS UNIVERSITY, Austin, Texas; Walter E. Muller; Amplification of Positrons in Matter; 3 years; $38,000
TRENT COLLEGE, Hartford, Conn.; Robert Lindsay; Antiferromagnetic Materials; 3 years; $11,600
TUPERS UNIVERSITY, Medford, Mass.; Kathryn A. McCardy; Thermal Conductivity of Alkali Halide Crystals; 2 years; $87,300
TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; John D. Shewell; Quantum Mechanics in a Noncommuting Phase Space; 1 year; $4,400
UNIVERSITY OF UTAH, Salt Lake City, Utah; J. W. Keuffel; Cosmic Ray Mesons; 3 years; $77,100
UNIVERSITY COLLEGE OF SYRACUSE UNIVERSITY, Utica, N.Y.; Peter Fung; Theory of Nuclear Fusion; 2 years; $7,900
VANDERBILT UNIVERSITY, Nashville, Tenn.; Joseph H. Hamilton; Nuclear Spectroscopy; 2 years; $22,100
Charles F. Roos; Photolysis Measurements Using High Magnetic Fields; 1 year; $28,400
WASHINGTON UNIVERSITY, St. Louis, Mo.; Thomas A. Pond; Weak Interactions; 2 years; $51,900
UNIVERSITY OF WASHINGTON, Seattle, Wash.; Jere J. Lord; Emulsion Study of High Energy Nuclear Interactions; 2 years; $24,000
Edwin A. Veiling; Nuclear and Electronic Magnetic Relaxation in Crystals; 2 years; $18,600
WAYNE STATE UNIVERSITY, Detroit, Mich.; Leonard O. Roessler; Nuclearity of Bubbles in a Superheated Liquid Exposed to Ionizing Radiations; 2 years; $35,900
WELESLEY UNIVERSITY, Middletown, Conn.; Forrest L. Boley; Atmospheric Ozone Radiation; 2 years; $23,900
Edwin F. Taylor; Investigation of Electric Field Gradients in Alkali Halide Crystals; 2 years; $18,400
WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; Harvey N. Redmond, Jack D. Graybeal and Gerald C. Michael; Microwave Spectroscopy and Electronic Magnetic Resonance; 3 years; $54,900
WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; Gerald Taba; Rotation and Gravitation in Statistical Systems; 2 years; $24,500
WHITMAN COLLEGE, Walla Walla, Wash.; Robert B. Bennett; Vapourisation of Cesium in Argon Atmosphere; 2 years; $15,800
UNIVERSITY OF WICHITA, Wichita, Kansas; John B. Breschak; Effects of Adsorbed Gas on Photocell Work Function; 2 years; $16,800
WILLIAMS COLLEGE, Williamstown, Mass.; Fielding Brown; Ferroelectric and Semiconducting Properties of Barium Titanate; 2 years; $19,900
UNIVERSITY OF WISCONSIN, Madison, Wis.; Harold W. Lewis; Problems in Theoretical Physics; 2 years; $29,000
Julian E. Mack; Structure of Atomic Spectra; 2 years; $42,500
K. Rollefsen; Summer Research Institute of Theoretical Physics; 2 months; $27,600
UNIVERSITY OF WYOMING, Laramie, Wyo.; Burton H. Muller; Nuclear Relaxation Times in Paraffin Hydrocarbons; 3 years; $15,900
YALE UNIVERSITY, New Haven, Conn.; Henry A. Fischbank; Experimental Research in Low Temperature Physics; 3 years; $93,900
C. T. Lane; Rotational States in Superfluid Helium; 3 years; $54,500

PSYCHOLOGY

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Evelyn Shaw; Development of Schooling Behavior; 2 years; $28,300
AMHERST COLLEGE, Amherst, Mass.; John W. Davénport; Reinforcement Variables in Simple Learning Situations; 3 years; $34,100
UNIVERSITY OF ARIZONA, Tucson, Ariz.; Robert W. Lansing; Attention Changes in Man; 2 years; $18,600
Joe T. Marshall; Research in Perception; 3 years; $31,400
UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; D. H. Kausler; Wind and Oerald C. Michael; Zn—Iron—Oxygen—Carbon; 2 years; $24,000
BROWN UNIVERSITY, Providence, R.I.; Frances L. Clayton; Factors Influencing Receptive Syntax; 2 years; $11,100
J. W. Kling; Factors Influencing Response Strength; 2 years; $14,400
Lewis P. Lipsitt; Studies of Discrimination Learning; 2 years; $11,600
UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Norman H. Anderson, Los Angeles; Probabilistic Discrimination Learning; 3 years; $97,700
Nicholas E. Collas, Los Angeles; Anal—
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<td>Psychology of Learning and Thinking; 4 years</td>
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<td>Johns Hopkins University, Baltimore, Md.; James</td>
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<td>D. Diamond; The Relationship between Verbal</td>
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<td>Content and Free Recall; 2 years; $11,500</td>
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<td>Wendell R. Garner; Support of Animal Research</td>
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<td>Activities; 1 year</td>
<td>$7,000</td>
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<td>University of Kansas, Lawrence, Kans.; Richard F.</td>
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<td>Johnston; Comparative Behavior of American Ground</td>
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<td>Doves; 21 months; $1,800</td>
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<td>Charles D. Michener; Origin and Evolution of the</td>
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<td>Female Cages of Bees; 3 years</td>
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<td>University of Massachusetts, Amherst, Mass.;</td>
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<td>Warren H. Teichner; Behavioral and</td>
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<td>Psychophysiological Effects of Cold Environment;</td>
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<td>3 years</td>
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<td>University of Miami, Coral Gables, Fla.; Warren J.</td>
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<td>Wisby; Anatomy and Physiology of the Visual</td>
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<td>Apparatus of Pelagic Fishes; 13 months; $7,300</td>
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<td>University of Michigan, Ann Arbor, Mich.; Mathew</td>
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<td>Alpern; Studies of Contrast Phenomena; 5 years;</td>
<td>$28,400</td>
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<td>J. David Birch; Role of Extinction in Reversal</td>
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<td>Learning; 2 years; $24,100</td>
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<td>James Olds; Brain Changes and Learning; 3 years;</td>
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<td>$62,400</td>
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<td>Robert A. McCleary; Studies of Intercellular</td>
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<td>Transfer; 3 years; $50,700</td>
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<td>University of Minnesota, Minneapolis, Minn.; David L.</td>
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<td>LaBerge; Studies in Stimulus Generalization; 1</td>
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<td>year; $9,000</td>
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<td>Harold W. Dawson; Probability Learning; 3 years;</td>
<td>$20,500</td>
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<td>Montana State University, Missoula, Mont.; Clyde E.</td>
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<td>Noble; Analysis of Trial-and-Error Learning; 2</td>
<td>$9,900</td>
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<td>University of Oklahoma, Norman, Okla.; Canada; J.</td>
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<td>P. Cordeau; Electrophysiological and Anatomical</td>
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<td>Correlates of Recent Memory; 2 years; $15,000</td>
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<td>New York State Psychiatric Institute, New York, N.</td>
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<td>Y.; Carney Landis; Studies of Flanker-Fusion</td>
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<td>Determinants; 3 years; $47,900</td>
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<td>Northwestern University, Evanston, Ill.; Stephen</td>
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<td>E. Glickman; Studies of Animal Behavior; 1 year;</td>
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<td>$5,600</td>
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<td>University of Oklahoma Research Institute,</td>
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<td>Norman Okla.; Irene Hubicka; Drive and Incentive</td>
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<td>as Determinants of Performance; 1 year; $130</td>
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<td>University of Oregon, Eugene, Oreg.; Robert F.</td>
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<td>Fagot; Psychophysical Measurement; 14 months; $9,600</td>
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<td>University of Pennsylvania, Philadelphia, Pa.;</td>
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<td>Philip Teitelbaum; Effect of Hypothalamic Lesions</td>
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<td>on Behavior; 3 years; $35,100</td>
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<td>University of Portland, Portland, Oreg.; Nissim</td>
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<td>Levy; Effects of Omission of Reward; 2 years; $21,200</td>
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APPETITIONAL REWARD SITUATIONS; 2 years; $36,500

RESTORATION, THE STATE UNIVERSITY, New Brunswick, N.J.; William F. Reynolds; Role of Secondary Reinforcement in Learning; 2 years; $18,700

ST. OLAF COLLEGE, Northfield, Minn.; William W. Roseboom; Mediation Processes in Human Avoidance Behavior; 2 years; $2,500

SMITHSONIAN INSTITUTION, Washington, D.C.; Martin Moynihan, Canal Zone Biological Area; Behavior Patterns of Certain Tropical American Carnivores; 7 months; $20,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; William W. Grimes; Conditioning and Perception; 2 years; $9,900

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Arnold M. Small, Jr.; Perception of Periodicity in the Auditory System; 3 years; $46,200

SWARTHMORE COLLEGE, Swarthmore, Pa.; Hans Wallach; Study of Perceptual Learning; 3 years; $43,000

SYRACUSE UNIVERSITY RESEARCH INSTITUTE, Syracuse, N.Y.; Thomas J. Case; Integrative Mechanisms in the Pairing of Predatory Birds; 3 years; $37,600

TEXAS CHRISTIAN UNIVERSITY, Fort Worth, Texas; Malcolm D. Arnot and Winton H. Manning; Auditory Pattern Perception; 1 year; $3,900

UNIVERSITY OF TORONTO, Toronto, Canada; Abram Amesel; Inconsistent Reward Situations; 26 months; $20,400

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; Loh Beng Tei; Interspecies Studies of Behavior; 1 year; $10,900

Edward A. Bilodeau; Research on Long-Term Human Memory; 3 years; $45,000

UTAH STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, Logan, Utah; Keith L. Dixon; Communication Signals in Birds; 2 years; $11,000

Allen W. Stokes; The Ethology of North American Quail; 3 years; $24,400

YASSAR COLLEGE, Poughkeepsie, N.Y.; Eric G. Hehennay; Inhibitory Effects in Human Vision; 2 years; $25,400

UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Frank A. Geierd; Parameters of Cutaneous Communication; 2 years; $75,200

UNIVERSITY OF WISCONSIN, Madison, Wis.; John T. Emlen, Jr.; Origin and Development of Behavior Patterns in Birds; 3 years; $22,500

Arthur D. Hauser; Environmental Influences on Fish Behavior; 3 years; $47,600

Willard R. Thurlow; Studies of Auditory Pattern Formation; 2 years; $15,000

YALE UNIVERSITY, New Haven, Conn.; Richard J. Andrew; Motivational Organization and Corollary Inactive Acts; 3 years; $18,000

John F. Flynn; Behavioral Effects of Afterdischarge in the Limbic System; 3 years; $64,800

Allan R. Warner; Nonreinforcement in Appetitional Reward Situations; 2 years; $22,200

REGULATORY BIOLOGY

UNIVERSITY OF ALABAMA, University, Ala.; Herschel V. Murdaugh, Jr., Birmingham; Secretion of Endogenous Metabolites and Related Substances; 3 years; $60,000

UNIVERSITY OF ALASKA, College, Alaska; Laurence Irving; Nervous Function in the Changing Temperatures of Peripheral Tissues and Its Effect on Cold; 2 years; $41,100

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Dorothy E. Bliss; Neurosecretory Control of Locomotion and Growth in the Land Crab; 5 years; $74,700

UNIVERSITY OF ARIZONA, Tucson, Ariz.; R. H. Maier; Metabolites and Antidiuretic Fractions in Plants; 2 years; $11,600

BERKELEY COLLEGE, Berea, Ky.; Frank B. Galley; Early Stages of Chlorophyll and Chloroplast Development; 3 years; $19,100

BRYN MAWR COLLEGE, Bryn Mawr, Pa.; L. Joe Berry; Effects of Bacterial Endotoxin on Adrenal Response to Acth; 3 years; $41,300

UNIVERSITY OF BUFFALO, Buffalo, N.Y.; John W. Boylan; Blood-Sea Water Barrier to Urea; 3 years; $5,100

Vincent Santilli; Leaf Reconcilease in Tobacco Mosaic Virus Infection; 3 years; $24,600

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Allan J. Brady, Los Angeles; Connection Between Environment and Regulation in Contractile Tissues; 4 years; $73,700

Karl C. Hamner, Los Angeles; Plant Photoperidism as Influenced by Endogenous Rhythms; 1 year; $11,400

Ralph W. Kellogg and Nello Pace; Pulmonary Ventilation During Exercise of Altitude; 1 year; $14,000

O. A. Leonard, Davis; Translocation Relationships of Natural Substances and Parasites Between Coniferous and Deciduous Hosts; 4 years; $29,500

Leonard Machlis; Production and Determination of the Chemical Structure of 5-Arginine; 2 years; $35,800

John H. Phillips, Jr.; Internal Nutrient Transport in Echinodermata; 2 years; $20,500

Wilton B. Quay; Neural and Biochemical Regulation of Pinal Metabolism; 1 year; $11,400

C. E. Vartos; Mechaical Transmission of Plant Viruses; 3 years; $4,000

CACE HAZE MARINE LABORATORY, INC., Placida, Fla.; Eugene Clark; Physiology and Morphology of Abdominal Pores and Associated Structures; 2 years; $8,600

UNIVERSITY OF CHICAGO, Chicago, Ill.; Edward S. Mika; Effect of Environment on Datura Stramonium; 2 years; $19,600

CHILDREN'S HOSPITAL RESEARCH FOUNDATION, Cincinnati, Ohio; Clark D. West; Equipment for Studies in Antibody Production; 1 year; $1,650

UNIVERSITY OF CINCINNATI, Cincinnati, Ohio; Ralph W. Eitkin; Interrelationship of the Brain and Endocrine Organs; 3 years; $28,000

CLARK UNIVERSITY, Worcester, Mass.; Vernon Admiadjian; Laboratory Controlled Lichen Synthesis; 3 years; $30,600

COLLEGE OF MEDICAL EVANGELISTS, Los Angeles, Calif.; Howard R. Bierman; Life Span of the Blood Elements; 1 year; $8,100

COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.; Frank B.
Salsbury, Metabolic Approach to the Study of Flower Formation; 2 years; $22,800

ALFRED J. CROWLE, COLORADO FOUNDATION FOR UNIVERSITY OF COLORADO, BOULDER, COLO.; ALFRED J. CROWLE, COLORADO FOUNDATION FOR RESEARCH IN TUBERCULOSIS, DENVER; ACQUIRED IMMUNITY TO TUBERCULOSIS; 3 YEARS; $57,300

Gilles W. Fifeley, Denver; Mass Transfer Between Gas and Tissue Phases of the Lung; 2 years; $14,400

COLUMBIA UNIVERSITY, NEW YORK, N.Y.: LOUISE J. CLISHER AND MERO R. ROCENTI; ENDOCINE FACTORS DURING STARVATION-INDUCED SALT DEFICIENCY IN RABBITS; 3 YEARS; $39,800

WILLIAM D. YOUNG; PHYSIOLOGICAL AND MICROSCOPICAL STUDIES OF MUSCLE CELLS; 3 YEARS; $76,600

UNIVERSITY OF CONNECTICUT, STORRS, CONN.; DONALD F. WETHERELL; PHYSIOLOGICAL BASIS OF SALT-TOLERANCE IN UNICELLULAR GREEN ALGAE; 3 YEARS; $17,900

CORNELL UNIVERSITY, ITHACA, N.Y.; DONALD F. WETHERELL; PHYSIOLOGICAL BASIS OF SALT-TOLERANCE IN UNICELLULAR GREEN ALGAE; 3 YEARS; $17,900

DARTMOUTH COLLEGE, HANOVER, N.H.; L. HEYL; ENDOCRINOLOGICAL STUDY OF TESTES; 3 YEARS; $34,000

DUKE UNIVERSITY, DURHAM, N.C.; JOHN W. EVERETT; PARNEROTIN; 3 YEARS; $32,600

F. JOHN VERNBERG; OLMANN ADAPTATION (II OF PLANTS; 2 YEARS; $39,900

FRANKLIN AND MARSHALL COLLEGE, LANCASTER, PA.; RAYMOND E. 0. BENNETT; NUTRITIONAL RELATIONSHIPS BETWEEN DEDEULUFIBRIO DESULFURICANS AND ANTHAMAS BLASSII; 3 YEARS; $39,000

GEOBIE WASHINGTON UNIVERSITY, WASHINGTON, D.C.; FRIDERIC H. J. NORDEN; EXPERIMENTAL ANALYSIS OF PIGEON ORIENTATION; 3 YEARS; $34,000

INDIANA UNIVERSITY FOUNDATION, BLOOMINGTON, IND.; SIDNEY OCHS, INDIANAPOLIS; APOTROPSIC FLUID IN NERVES; 3 YEARS; $38,500

MANHATTAN COLLEGE, NEW YORK, N.Y.; JOHN D. LAWRENCE; PHARMACOLOGICAL AND PHARMACODYNAMIC STUDIES DURING ATROPHIC CAUSES AND OSMOTIC CHARACTERISTICS OF INHIBITING URINARY BLADDER OF SEA TURTLE; 1 YEAR; $1,300

UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.; WILLIAM A. BRODSKY; ELECTROPHYSIOLOGICAL AND SOMATOLOGICAL CHARACTERISTICS OF INHIBITING URINARY BLADDER OF SEA TURTLE; 1 YEAR; $1,300

RUTH MCCINTOCK; POTENTIOMETRIC STUDY OF RETINAL TRANSPORT OF IONS; 3 YEARS; $24,400

EUGENE M. RENKIN; REGULATORY MECHANISMS IN BLOOD CIRCULATION; 3 YEARS; $17,400

UNIVERSITY OF GEORGIA, ATHENS, GA.; EUGENE M. RENKIN; REGULATORY MECHANISMS IN BLOOD CIRCULATION; 3 YEARS; $17,400

UNIVERSITY OF ILLINOIS, URBANA, ILL.; HAROLD C. HANSON; PARASITOLOGY AND PHYSIOLOGY OF CANADA CREE; 2 YEARS; $5,200

UNIVERSITY OF IOWA, IOWA CITY, IOWA.; H. MAC VANDIVER AND H. S. WILLIS; HOST RESISTANCE IN CHRONIC INFECTIONS; 3 YEARS; $35,600

UNIVERSITY OF LOUISIANA, BATON ROUGE; RICHARD G. MALSBERGER; VIRAL DISEASES OF FRESH WATER FISHES; 3 YEARS; $30,800

UNIVERSITY OF MASSACHUSETTS, AMHERST, MASS.; JOHN G. MONEBER; CELL DIFFERENTIATION AND INHIBITOR SUBSTANCES; 1 YEAR; $8,400

MICHAEL REESE HOSPITAL, CHICAGO, ILL.; H. NICOLLS; EFFECTS OF LIVER ON SECRETION; 3 YEARS; $30,800

UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.; J. W. LAURER AND C. L. VOTAW; SOMATIC AND VISCERAL EFFECTS OF RELATIONS OF THE AMYGDALA; 3 YEARS; $42,200

LEHIGH UNIVERSITY, BETHLEHEM, PA.; RICHARD G. MALSBERGER; VIRAL DISEASES OF FRESH WATER FISHES; 3 YEARS; $30,800
and the Hippocampal-Septal Regions; 4 years; $31,600

University of Minnesota, Minneapolis, Minn.; J. Jr., J. Jeske; Physiological Studies on Psychrophilic Bacteria; 3 years; $26,600 Richard L. Varco; Delayed Bacterial Hyperosmolarity and the Ramospore Reaction; 6 years; $20,000 University of Missouri, Columbia, Mo.; Robert P. Breitenbach; Gonad and the Adrenal in Annual Aging; 3 years; $32,000 Warren R. Fleming; Enzymatic Study of the Gills and Kidney of Several Tetras; 3 years; $32,200

University of Nebraska, Lincoln, Nebr.; Harold J. Ball; Fundamental Aspects of Organisms to Light and Photoperiod; 3 years; $14,100

New York University, New York, N.Y.; Arthur F. Battista; Effects of Ultrasonic Radiation on Cortical Potentials; 2 years; $5,800

North Carolina State College of Agriculture and Engineering, Raleigh, N.C.; Gerald H. Eklund; Influence of the Ethosynthetic Mixture and Niter Fixation; 2 years; $13,300

University of Notre Dame, Notre Dame, Ind.; Bernard S. W. Stotmann; The Serum of Germfree Animals; 3 years; $52,100

Ohio State University Research Foundation, Columbus, Ohio; Melvin S. Rheins; Auto-antibodies in Experimental Tuberculous Disease; 3 years; $25,200

Oregon State College, Corvallis, Oreg.; Carroll W. Fox; Biological Action of "Estrogen" Compound in Legumes; 2 years; $25,700

J. Lowell Young; Organic Nitrogen Constituents of Soil Organic Materials; 5 years; $27,000

University of Oregon Medical School, Portland, Oreg.; George Austin; Single Cell Activity and Repetitive Firing of Dorsal Root Ganglion and Spinal Cord Neurons; 2 years; $26,200

Pennsylvania State University, University Park, Pa.; Hubert Frings; Structure and Function of Sound-Receiving Organs of Insects; 8 years; $28,300

University of Pennsylvania, Philadelphia, Pa.; Charles C. Helfer; Utilization of Blood Urea in Lagomorphs; 3 years; $14,300

University of Pittsburgh, Pittsburgh, Pa.; Charles L. Ralph; Neuroendocrinology of Arthropods; 3 years; $25,500

Purdue Research Foundation, Lafayette, Ind.; John B. Bancroft; Purification and Properties of Certain Plant Viruses; 4 years; $26,600

Richard C. Sanborn; Regulation of Growth of Arthropod Tissues; 4 years; $47,100

Research Foundation, Oklahoma State University, Stillwater, Okla.; W. Stanley Newcomer; Actions and Metabolism of Various Thymoactive Analogs in the Chicken; 2 years; $20,500

Research Foundation of State University of New York, Albany, N.Y.; Svend Heiberg and Albert L. Leaf; Forest Tree Nutrition and Forest Fertilization; 3 years; $26,100

Research Foundation of University of Rhode Island, Kingston, R.I.; Edward R. Chase; Mechanism of Insulin Resistance in Strain of Mice; 8 years; $33,800

University of Rochester, Rochester, N.Y.; E. F. Adolph; Ontogeny of Physiological Regulation in Animals; 3 years; $15,100

Peter Z. Allen; Immunological Studies on Amylase; 5 years; $88,900

E. S. Nusselt; Purification and Properties of Enterococcus; 3 years; $60,300

Rutgers, The State University, New Brunswick, N.J.; Hans Fisher; Influence of the Physiological State of Body Proteins on the Amino Acid Requirement of the Chick; 4 years; $31,400

W. R. Robbins; Heavy Metal Nutrition and Metabolism of Plants in Relation to Photoperiodism; 4 years; $35,900

Paul D. Sturkie; Outgrowth in the Fowl; 3 years; $19,800

St. Louis University, St. Louis, Mo.; Joseph A. Panuska, S. J.; Annual Full-Winter Aspergillus and Anéus and the Spring Breeding; 4 years; $1,060

University of Southern California, Los Angeles, Calif.; Paul D. Saltman; Response of Algae to the Gibberellins and Other Plant Hormones; 2 years; $18,400

Stanford University, Stanford, Calif.; Frederick A. Fuhrman; Metabolism in Deep Hypothermia; 1 year; $11,700

O. H. Robertson; Hyperadrenocorticoidism in Pacific Salmon and Relation to Postspawning Death; 3 years; $32,700

State College of Washington, Pullman, Wash.; Donald S. Farmers; Regulation of the Annual Cycle of Fat Deposition; 4 years; $46,000

Nee Higabotham and Robert J. Fester; Electrophoretic Patterns of Higher Plant Cells and the Relations of Potential to Salt Accumulation; 3 years; $21,700

State University of Iowa, Iowa City, Iowa; George G. Zabka; Influence of Photoperiodism Upon CO₂ Fixation; 3 years; $9,300

Texas Agricultural and Mechanical College, College Station, Tex.; Samuel P. Johnson; Role of Light and Temperature in the Growth and Development of Plants; 2 years; $2,800

University of Texas, Austin, Tex.; J. Allen Scott and Etta Mae MacDonald; Helminth Research Laboratory, Galveston; Nature of Race or Species Immunity; 1 year; $10,800

Tulane University of Louisiana, New Orleans, La.; D. Eugene Copeland; Histophysics of Somatotrophic Function in Teleosts; 3 years; $48,700

University of Utah, Salt Lake City, Utah; Carl E. Edwards; Efferent Control of Stretch Receptors; 4 years; $40,000

Washington State University, Pullman, Wash.; Orlin Biddulph; Nutritional Interrelationships of the Various Parts of Plants; 3 years; $2,300

University of Wisconsin, Madison, Wis.; H. L. Emslieck; Filterable Agent Present in Methyloarchetanthe, Alcan Sarcomas; 3 years; $42,600

Washington University, St. Louis, Mo.; D. C. Tosteson; Secretion Across Epithelial Membranes; 3 years; $30,000

Wilkes College, Wilkes-Barre, Pa.; Charles B. Relf; Protoplastic Similarities Between Green and Colorless Forms of Euglena; 1 year; $6,400
MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, EAST LANSING, Mich.; Milton Rokeach; Cognitive Organization and Modification; 2 years; $32,000

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; James J. Jenkins; Associative Models and Symbolic Behaviors; 3 years; $28,300

NORTHERN ILLINOIS UNIVERSITY, DeKalb, Ill.; Robert F. Winch; Identification in One-Parent Families; 1 year; $14,700

UNIVERSITY OF OREGON, Eugene, Oreg.; Walter T. Matlin; Theory of Status Adjustment; 1 year; $19,300

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.; C. K. Yang; Structural Analysis of Fosphen; 2 years; $19,100

SAN DIEGO STATE COLLEGE FOUNDATION, San Diego, Calif.; Joseph B. Sidowski; Learning in a Minimal Social Situation; 2 years; $14,500

UNIVERSITY OF SOUTHERN CALIFORNIA; Los Angeles, Calif.; Georges Sabagh; Growth of Urban Subareas; 2 years; $19,500

STANFORD UNIVERSITY, Stanford, Calif.; Joseph Berger; Role-Specialization in Small Groups; 2 years; $23,800

Leon Festinger, Behavioral Implications of Dissonance Theory; 3 years; $65,100

STANFORD UNIVERSITY RESEARCH INSTITUTE, Stanford, Calif.; Judson Mills; Voluntary Exposure to Information; 2 years; $15,600

TULSA UNIVERSITY, Tulsa, Okla.; Bruce A. Wolman; Individual Traits in Decision-Making; 2 years; $18,000

UNIVERSITY OF WISCONSIN, Madison, Wis.; Norman B. Ryder; Models of Emographic Transition; 14 months; $16,300

YALE UNIVERSITY, New Haven, Conn.; Sidney I. Perode; Judgment of Social Stimuli; 2 years; $17,500

SYSTEMATIC BIOLOGY

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Wesley B. Lanyon; Systematics and Evolution of Tyrrant Flycatchers of the Genus Myiarchus; 1 year; $14,100

Nicholas S. Obraztsov; Revision of the Genera of the Nearctic Moths; 2 years; $16,300

Herbert Ruckes; Revision of the Pentatomid Subfamily Discocophinae; 2 years; $11,700

Richard G. Van Gelder; Systematic Revision of the Skunks of the Genus Mephitis and Conepatus; 3 years; $14,300

ARIZONA STATE UNIVERSITY, Tempe, Ariz.; Noyes H. Russell, Jr.; Taxonomic and Evolutionary Study of the Violets of North America; 2 years; $3,000

Richard S. Beal; Taxonomic Investigation of the Dermestid Beetle Genus Attagenus; 3 years; $16,500

Herbert L. Stahnke; A Taxonomic Study of the Scorpions; 2 years; $10,800

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Francis Drouet; Revision of the Multichromatous Oscillatoriaeae; 1 year; $15,000

WALDENEY FOUNDATION FOR BIOSCIENTIFIC RESEARCH, Solvang, Calif.; J. Laurens Barnard; Quantitative Systematics of Marine Amphipoda; 3 years; $11,000

BERMUDA BIOLOGICAL STATION FOR RESEARCH, Inc., St. Georges West, Bermuda; William R. Taylor; Distribution and Comm...
position of the Deep Water Algal Vegetation; 1 year; $11,800
BERNICE P. BISHOP MUSEUM, Honolulu, Hawaii; J. Linsley Gressitt; Zoogeography and Evolution of Pacific Insects; 3 years; $20,000
RHODES STATE UNIVERSITY, Purdue, Utah; David L. Clark; Cretaceous Cephalopods of Texas; 2 years; $15,500
STEPHEN S. WOOD; Systematic Studies of Bark Beetles; 3 years; $16,300
CALIFORNIA ACADEMY OF SCIENCES, San Francisco, Calif.; G. Dallas Hanna; Siliceous Microfossils of the Late Miocene of Tertiary Sediments of California; 3 years; $18,000
UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; J. Wrede Durham, Paul D. Hurd, J.R., and Ray F. Smith; Paleontological Studies of Tertiary Insect Bearing Amber; 2 years; $24,000
E. G. Linsley; Monographic Study of the North American Corambycidae; 3 years; $19,000
Harlan Lewis, Los Angeles; Systematics of the Family Ondraceae; 2 years; $35,000
Mildred E. Mathias, Los Angeles; Taxonomic Studies in the Umbelliferae; 3 years; $21,300
A. Earl Pritchard; Diptera of Western North America; 3 years; $22,000
Donald E. Savage; Vertibrate Paleontology and Nonmarine Stratigraphy in the Paris Basin; 3 years; $31,300
Shirley Sparkling; Santa Barbara; Life Cycles of Some Marine Algae of the Rhodophycidae; 1 year; $2,100
G. Ledyard Stebbins; Evolutionary Relationships in the Galiurn Multiflorum Complex; 1 year; $12,500
Peter P. Vaughan, Los Angeles; Lower Pteridosperm Vertebrate Fauna of the Four Corners Area of the United States; 3 years; $25,500
CANGHIS COLLEGE, Buffalo, N.Y.; John L. Blum; Composition and Phytophagy of the Coastal Faunula Bell; 3 years; $10,500
CARNegie MUSEUM, Pittsburgh, Pa.; H. E. Milliron; The Taxonomy of the Western Hemisphere Bumblebees; 1 year; $6,200
CHICAGO NATURAL HISTORY MUSEUM, Chicago, Ill.; Phillip Hereszvits; Check List of the Recent Mammals of South America; 3 years; $17,200
Melvin A. Traylor; Checklist of the Birds of Angola; 2 years; $12,000
UNIVERSITY OF CHICAGO, Chicago, Ill.; Barbara F. Palmer; Comparative Floral Morphology of the Ericaceae; 3 years; $24,000
CHICAGO STATE COLLEGE, Chico, Calif.; David H. Knstner; Field and Taxonomic Studies of Neuroethineae and Pygostomini; 30 months; $13,500
COLLEGE OF THE PACIFIC, Stockton, Calif.; Joel W. Hedgpeth; Adaptive Morphology of California Pecypods; 1 year; $350
COLLEGE OF PUGET SOUND, Tacoma, Wash.; Murray L. Johnson and Merrill J. Wicks; Taxonomic Relationship of Mammals of North America; 3 years; $22,200
UNIVERSITY OF COLORADO, Boulder, Colo.; William A. Weber and Sam Shushan; Taxonomic and Phytophagy Studies on the Lichenaceae of Western North America; 3 years; $25,000
CORNELl UNIVERSITY, Ithaca, N.Y.; Edward C. Rand; Collection and Study of Pelagic Fishes From the South Atlantic; 1 year; $2,500
DEPAW UNIVERSITY, Greencastle, Ind.; T. G. Tuncher; A Revision of the Plant Family Piperaeae; 3 years; $7,400
DUKE UNIVERSITY, Durham, N.C.; William L. Culverone; Monographs of the Lichen Genus Cetraria; 50 months; $33,700
Robert L. Wilbur; Systematic Collections of Graptolites; 2 years; $45,600
FLORIDA GEOLOGICAL SURVEY, Tallahassee, Fla.; S. J. Olsen; Postcranial Skeletal Characters of Bion and Bos; 1 year; $1,800
FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Adrian William Poltm; Tauxonomy, Distribution, and Relationships of Lenticiculous and Caulicolous Fresh Water Ascomycetes and Fungi imperfecti; 2 years; $12,200
UNIVERSITY OF FLORIDA, Gainesville, Fla.; Cooper J. Goin; Systematics and Evolution of South American Tree Frogs; 3 years; $14,500
FUNDACIOn MlGUEL LILLO, Tucuman, Argentine; Rolf Singer; ApACEaolies of South America; 1 year; $8,100
UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N.C.; John P. Rankin; Zoological Studies on the Raumarion; 2 years; $18,300
UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Aroentean Tetrapods; 2 years; $13,500
DUKE UNIVERSITY, Durham, N.C.; Richard W. Pohl; Osteology and Evolution of the Eastern and Paean 44octopus; 2 years; $11,800
UNIVERSITY OF ILLINOIS, Urbana, Ill.; John L. Bell; Paleontology and Nonmarine Stratigraphy of the Ascomycetes in Relation to their Taxonomy; 3 years; $25,000
Julian H. Miller; Monographic Study of Genera of the Family "Xylariaceae" Excepting "Hypococcus"; 2 years; $18,000
UNIVERSITY OF IOWA, Iowa City, Iowa; Donald E. Savage; Zoology of Vertebrate Fauna of the Gulf of St. Lawrence; 2 years; $4,800
University of Iowa; Gary, Iowa; Lower Cretaceous Cephalopoda; 2 years; $13,500
UNIVERSITY OF MONTANA, Missoula, Mont.; D. Elmo Hardy; Diptera of Hawaii; 4 years; $10,500
University of Montana; Missoula, Mont.; Rolf Singer; ApACEaolies of South America; 1 year; $8,100
UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N.C.; John P. Rankin; Zoological Studies on the Raumarion; 2 years; $18,300
UNIVERSITY OF IOWA, Iowa City, Iowa; Donald E. Savage; Zoology of Vertebrate Fauna of the Gulf of St. Lawrence; 2 years; $4,800
Albert H. Banner; Zoogeography of the Snapping Shrimps of the Central Pacific; 2 years; $3,700
D. Elmo Hardy; Diptera of Hawaii; 4 years; $10,500
HUGH AVERY FREEMAN, Garland, Texas; Ecological and Systematic Study of the Magaspyridae of North America; 3 years; $8,800
UNIVERSITY OF ILLINOIS, Urbana, Ill.; John O. Corliss; Systematics and Genetics of Ciliated Protozoa; 3 years; $33,800
IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, Ames, Iowa; Richard W. Pohl; Biogeographic Studies on Bismarckian American Species of Mammalia; 3 years; $14,100
JACKSONVILLE STATE COLLEGE, Jacksonville, Ala.; Emmett W. Price; Revision of the Monogenic Tetraradiata; 4 years; $10,800
KAIser FOUNDATION, Oakland, Calif.; Benjamin G. Chitwood, Richmond; Studies in Nematology and Related Sciences; 2 years; $12,400
KANSAS STATE TEACHERS COLLEGE, Emporia, Kansas; David F. Parkinson; Taxonomic and Ecological Studies of the Charadidiformes of Bothia Peninsula, N.W.T.; 1 year; $3,800
KANSAS STATE UNIVERSITY OF AGRICULTURE
AND APPLIED SCIENCE, Manhattan, Kansas;
Reginald H. Palter, Study of Types of American Bombusidae; 2 years; $11,000

UNIVERSITY OF KANSAS, Lawrence, Kansas;
Sydney A. Van Doren, Monograph of Chilhausia—
Their Taxonomy, Origins and Relationships;
1 year; $6,000

William E. Duellman; The Systematics and Distribution of Pugm Props in Middle American Rain Forests; 2 years; $10,600

Raymond C. Moore; Completion of Trea-
tise on Invertebrate Paleontology; 5 years;
$210,000

Charles D. Michener; Reclassification of Australian Bees; 1 year; $3,600

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Herbert P. Riley; Study of Species in South African Plants by the Method of Paper Chromatography; 2 years; $13,600

La SALLE COLLEGE, Philadelphia, Pa.; John S. Penny; Descriptive and Taxonomic Study of the Plant Micro-Fossils of New Jersey; 1 year; $2,500

LOUISIANA STATE COLLEGE FOUNDATION, Baton Rouge, La.; Herbert C. Demas and Wade Fox, New Orleans; Biochemical Investigation of the Phylogeny of Amphibian and Reptilian Blood; 5 years; $42,800

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; A. R. T. Hotchkiss; The Bearing of Cytological and Certain Physiological Data on the Taxonomy of the Characeae; 2 years; $6,200

MARYLAND DEPARTMENT OF RESEARCH AND EDUCATION, Solomons, Md.; Romeo Manuett, Chesapeake Biological Laboratory; Egg, Larvae and Very Young Fishes of Chesapeake Bay Waters; 3 years; $34,700

MIAMI UNIVERSITY, Oxford, Ohio; Charles Helmsch; Systematic and Comparative Anatomy of Herbaceous Dicots; 39 months; $21,000

UNIVERSITY OF MIAMI, Coral Gables, Fla.; C. Richard Robins, The Marine Laboratory; A Monograph on the Stromatopod Crustaceans of the Western Atlantic; 3 years; $21,500

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; G. W. Prescott; Systematic and Ecological Survey of North American Desmitidae; 3 years; $13,100

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Charles B. Beck; Morphological Studies of New York State Plants; 2 years; $12,500

Rogers McVeagh; Vascular Flora of Ja-
isco; 4 years; $27,100

Alexander H. Smith; Herbarium Materi-
als for Botanical Research; 5 years;
$17,850

Henry K. Townes, Jr.; Taxonomic Mono-
graphs of Neotropical Isochneumonidae; 3 years;
$14,600

Warren H. Werner, Jr.: Phylogenetic
Characteristics and Classification of the Fems;
4 years; $40,300

UNIVERSITY OF MINNESOTA, Minneapolis, Minnesota; A. Orville Dall; Fine Structure of Pollen Grains; 3 years; $22,200

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; George S. Burpee; Taxonomic Studies of Philodendron and Other Aroida; 3 years; $3,600

UNIVERSITY OF NEBRASKA, Lincoln, Nebraska;
Warren T. Ataya and Wallace E. LeBarge; Study of Rehabilitation of the Systematic Entomologi-
 cal Collections; 2 years; $20,000

Wallace E. LeBarge; Bees of the Genus Andrena in North America; 3 years; $15,000

HAROLD W. MANTER; Diinogeny Tremulea of Hawaiian Flies; 1 year; $3,200

NEW YORK BOTANICAL GARDEN, New York, N.Y.; Caroline K. Allen; American Lauraceae; Taxonomy and Geographical Distribu-
tion; 3 years; $23,300

Alma W. Barksdale; Investigation of Phylogenetic Relationships; 3 years; $48,900

H. W. Rickett; Proposals for Conserva-
tion of Botanical Names; 5 years; $12,600

NEW YORK ZOOLOGICAL SOCIETY, New York, N.Y.; Herndon G. Dowsing; A Taxonomic Study of the Family Vidae; 3 years; $17,000

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N.C.; Albert E. Radford; The Vascular Flora of North and South Carolina; 3 years; $23,500

New World New World
ANIMALS; 1 year; $3,000

University of New Mexico, Albuquerque; New World New World
ANIMALS; 1 year; $3,000

New Mexico; A. W. Prescott; Byometrical and Ioo.
cean8 of the Western Atlantic; 3 years;
$14,700

Charles B. Beck; Vascular Flora of the Florida Keys; 2 years; $12,300

Gilbert L. Voss, The Marine Laboratory; The Inshore Fish Fauna of the Florida Keys; 2 years; $12,300

Albert E. Radford; The Vascular Flora of the Western Atlantic; 3 years; $23,500

Mildred R. Detling; Tidepool Formations of Oregon and Their Taxonomy; 15 months; $3,900

Pennsylvania State University, University
Park, Pa.; Ronald A. Furseell; Photo-
geographical Affinities of the Mosses of the North and Northwestern Gulf Coast; 3 years; $14,700

PORTLAND STATE COLLEGE, Portland, Oregon;
Stanley G. Jewett; Systematic Studies in Plecoptera; 3 years; $2,800

James A. Macnab; Systematic and Eco-
logical Study of Endemic Earthworms of the Pacific Coast States; 3 years; $14,400

New World Calopterygine Dragonflies; 1 year; $3,000

University of Puerto Rico, Rio Piedras, Puerto Rico; Jena Maldonado Capriales; Study of Some Family Myriidae of Hemipterous Insects in Puerto Rico; 1 year; $500

Irving Fox; Relationship of Turtles to Snakes; 1 year; $3,000

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CONTINUING ANTARCTIC RESEARCH

Antarctic Advisory Committee

UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.; JAMES H. ZUMBERGE, A STUDY OF THE STATUS OF POLAR RESEARCH BY AMERICAN UNIVERSITIES, AND THE DEVELOPMENT OF RECOMMENDATIONS AS TO HOW THE AMOUNTS OF RESEARCH FUNDS AND OTHER ACADEMIC INSTITUTIONS CAN CONTRIBUTE THE MOST IN FUTURE POLAR RESEARCH; 1 YEAR; $12,500

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.; G. D. MELL, ACTIVITIES ON POLAR RESEARCH OF THE CONTINUING U.S. ANTARCTIC RESEARCH PROGRAM; 1 YEAR; $31,200

G. D. MELL, ACTIVITIES OF THE COMMITTEE ON POLAR RESEARCH; 1 YEAR; $60,503

Aurora and Airglow

ARCTIC INSTITUTE OF NORTH AMERICA, INC., WASHINGTON, D.C.; NORMAN J. OLIVER; CONSTRUCTION OF AURORA AND AIRGLOW RESEARCH IN ANTARCTICA; 2 YEARS; $198,480

NORMAN J. OLIVER; CORRELATION AND DATA REDUCTION OF IGY AND IGU AURORAL DATA FROM VARIOUS LOCATIONS; 1 YEAR; $12,773

NORMAN J. OLIVER; STUDY OF ENERGETIC SOLAR PARTICLES ASSOCIATED WITH DISTURBANCES AND THEIR EFFECTS UPON THE TERRESTRIAL IONOSPHERE; 1 YEAR; $16,175

L. C. MANSON, AIR FORCE BASE, BEDFORD, MASS.; NORMAN J. OLIVER; CONTINUATION OF PATROL SPECTROGRAPH DATA REDUCTION; 1 YEAR; $45,800

Biology and Medicine

AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK, N.Y.; ROBERT CUSHMAN MURPHY; STUDY OF PELAGIC BIRDS, INCLUDING RESEARCH INTO THE BEHAVIOR, LIFE HISTORY, TOLERANCES, DISTURBANCES, AND SYSTEMATIC RELATIONSHIPS; 1 YEAR; $4,721

ARCTIC INSTITUTE OF NORTH AMERICA, WASHINGTON, D.C.; WILLIAM J. L. SLADEN, JOHN HOPKINS UNIVERSITY; SUPPORT FOR MEDICAL MICROBIOLOGICAL WORK IN USARP, 1959-60; 1 YEAR; $9,000

BERNICE P. BISHOP MUSEUM, HONOLULU, HAWAII; LINDSAY GRESSITT; STUDIES OF AIRBORNE ORGANISMS IN THE ANTARCTIC AREA; 1959-60; 1 YEAR; $20,827

J. LINDELL GRESSITT; STUDIES OF AIRBORNE ORGANISMS IN THE ANTARCTIC AREA; 1959-61; 1 YEAR; $7,923

UNIVERSITY OF CALIFORNIA, BURKE, CALIF.; KARL C. HAMNER, LOS ANGELES; STUDIES OF ENDogenous Rhythms AT THE SOUTH POLE; 1 YEAR; $23,928

COLLEGE OF WILLIAM AND MARY, WILLIAMSBURG, VA.; WILLIAM J. HARGIS, JR.; A STUDY OF THE EETO- AND ENDO-PARASITES OF ANTARCTIC FISHES; 1 YEAR; $11,850

DOKE UNIVERSITY, DURHAM, N.C.; KAUT SCHMIDT-NEILSEN; CONTINUATION OF SALT AND WATER METABOLISM OF ADELIE PENGUINS; 2 YEARS; $10,692

GEORGE WASHINGTON UNIVERSITY, WASHINGTON, D.C.; WILLIAM W. SMITH; ANTARCTIC SCIENTIFIC PERSONNEL PROJECT; 1 YEAR; $10,980

WILLIAM W. SMITH; OBSERVATIONS OF INDIVIDUAL AND GROUP BEHAVIOR IN ANTARCTIC VICTORIA LAND FRANZ JOSPEH; 1 YEAR; $7,900

JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.; W. J. L. SLADEN AND CARL EKLUND; U.S. ANTARCTIC RESEARCH BIRD-BANDING PROGRAM; 2 YEARS; $21,850

KAISER FOUNDATION RESEARCH INSTITUTE, RICHMOND, CALIF.; ELLSWORTH C. DOUGHERTY; ANTARCTIC RESEARCH; 1 YEAR; $12,000

ELLSWORTH C. DOUGHERTY; STUDIES OF SOIL AND FRESHWATER MICROFAUNA AND MICROFLORA OF THE "DRY VALLEY" REGION, VICTORIA LAND, ANTARCTIC; 1 YEAR; $15,288

STANFORD UNIVERSITY, STANFORD, CALIF.; DONALD E. WOHLSCHEG; ECOLOGICAL AND PHYSIOLOGICAL STUDIES OF MCMURDO SOUND MARINE ANIMALS; 18 MONTHS; $59,715

DONALD E. WOHLSCHEG; SUPPORT OF THE ANTARCTIC RESEARCH LABORATORY, N.A.F., Mcmurdo, for the continuing 1959 BIOLICAL AND MEDICAL SCIENCE PROGRAM; 1 YEAR; $67,960

DONALD E. WOHLSCHEG; THE SUPPORT OF THE ANTARCTIC RESEARCH LABORATORY, N.A.F., Mcmurdo, for the continuing 1960 BIOLOGICAL AND MEDICAL SCIENCE PROGRAM; 1 YEAR; $61,240

UNIVERSITY OF KANSAS, LAWRENCE, KANS.; RUFUS H. THOMPSON AND KENNETH B. ARMSTRONG; A BIOLOGICAL INVESTIGATION OF FRESH WATER LAKES IN ANTARCTICA; 1 YEAR; $13,300

STANFORD UNIVERSITY, STANFORD, CALIF.; DONALD E. WOHLSCHEG; ECOLOGICAL AND PHYSIOLOGICAL STUDIES OF MCMURDO SOUND MARINE ANIMALS; 18 MONTHS; $59,715

WILLIAM J. HARGIS, JR.; A STUDY OF THE BIODISTRIBUTION OF THE "DRY VALEYS" REGION, VICTORIA LAND, ANTARCTIC; 1 YEAR; $12,773

WILLIAM J. L. SLADEN AND CARL EKLUND; MELT POOLS IN ANTARCTICA; 2 YEARS; $48,032

VIRGINIA FISHERIES LABORATORY, GLOUCESTER POINT, VA.; WILLIAM J. HARGIS; CONTINUATION OF STUDY OF CERTAIN PARASITES OF ANTARCTIC VERTEBRATES AND INVERTEBRATES; 2 YEARS; $40,204

UNIVERSITY OF WISCONSIN, MADISON, WIS.; RICHARD LEE PENNEY; ANALYSIS OF DATA COLLECTED ON THE BEHAVIOR OF THE ADILE PENGUIN; 2 YEARS; $4,236

RICHARD LEE PENNEY; STUDY OF THE BEHAVIOR OF THE ADILE PENGUIN; 1 YEAR; $7,500

Cosmic Rays

FRANKLIN INSTITUTE, PHILADELPHIA, PA.; MARTIN A. POMERANTS; BARTOL RESEARCH FOUNDATION; INVESTIGATIONS OF TIME VARIATIONS OF THE PRIMARY COSMIC RADIATION NEAR THE GEOMAGNETIC POLE; 2 YEARS; $49,880

MARTIN A. POMERANTS; BARTOL RESEARCH FOUNDATION; INVESTIGATIONS OF TIME VARIATIONS OF THE PRIMARY COSMIC RADIATION AT A GEOMAGNETIC POLE; 1 YEAR; $14,900

Geodesy and Cartography

AMERICAN GEOGRAPHICAL SOCIETY, NEW YORK, N.Y.; WILLIAM BRIESMEISTER; PREPARATION OF A NEW MAP OF ANTARCTICA; 1 YEAR; $17,780

Geology

UNIVERSITY OF KANSAS, LAWRENCE, KANS.; EDWARD J. ZELLER; DETERMINATION OF AGE OF LOW TEMPERATURE CONDITIONS IN ANTARCTICA BY THERMOLUMINESCENCE OF ROCKS: 1959-60; 1 YEAR; $15,288

WILLIAM J. HARGIS; DETERMINATION OF AGE OF LOW TEMPERATURE CONDITIONS IN ANTARCTICA BY THERMOLUMINESCENCE OF ROCKS: 1959-61; 18 MONTHS; $31,955

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Astronomy

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; J. C. Craddock; Bedrock Geology and Geomorphology of Some Nunataks in the Transantarctic Trough; 1 year; $1,208
OHIO STATE RESEARCH FOUNDATION, Columbus, Ohio; Samuel B. Treves; Geologic Survey of Antarctic Harbour Area; 18 months; $64,479
TUTTLE UNIVERSITY, Medford, Mass.; Robert L. Nichols; Geomorphic Field Project in the Wright, Victoria and Grant Mountain Dry Valleys; 1 year; $31,506
UNIVERSITY OF WISCONSIN, Madison, Wis.; Robert F. Black; Study of Patterned Ground in the Antarctic; 18 months; $41,689
Robert H. Dott, Jr.; Stratigraphic and Tectonic Relationships of Western Antarctic and Lower Palmer Peninsula to the Andean Mobile Belt; 1 year; $16,523

Geomagnetism

U.S. COAST AND GEODETIC SURVEY, Washington, D.C.; Conduct of the 1961 Geomagnetic Program; 2 years; $77,014
Magnetic Field Surveys in Antarctica; 2 years; $27,820
H. Arnold Karo; 1960 Antarctic Magnetic Observatories; 1 year; $15,000

Glaciology

ARCTIC INSTITUTE OF NORTH AMERICA, New York, N.Y.; Walter A. Wood; Conduct of Station and Traverse Glaciology of the Continuing U.S. Antarctic Research Program; 2 years; $1,973
UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; James H. Zumberg; Ross Ice Shelf Studies; 1960–61; 1 year; $51,788
Mount Union College, Alliance, Ohio; John R. Reid, Jr.; Ice Fabrics of a Farm Fold Near Camp Michigan, Antarctica; 1 year; $2,126
OHIO STATE UNIVERSITY RESEARCH FOUNDATION, Columbus, Ohio; Richard P. Goldthwait; Glaciology of Antarctic Fen; 2½ years; $53,972
R. P. Goldthwait; Reduction and Analysis of Glaciology Data From Antarctica 1960–61; 1 year; $45,518
SNOW, ICE AND PERMAFROST RESEARCH ESTABLISHMENT, Wilmette, Ill.; Preparation for Future Drilling and for Remeasurement of the Drill Hole at Byrd Station, Antarctica; 1 year; $19,200
UNIVERSITY OF WISCONSIN, Madison, Wis.; G. P. Woollard; Reconnaissance Trail and Airborne Measurements in Glaciology and Related Studies in Antarctica—1960; $51,025
G. P. Woollard, E. C. Thiel and C. R. Bentley; Support for Antarctic Traverse Program; 2 years; $48,342

Gravity

UNIVERSITY OF WISCONSIN, Madison, Wis.; G. P. Woollard; Geodetic Connections Between Key Points in Antarctica for: (A) Changes in Elevation of the Ice Surface With Time; (B) Changes in Land-Sea Relations; (C) Studies of Crustal Structure, Subice Geology and Ice Thickness; 2 years; $20,450

Ionospheric Physics

NATIONAL BUREAU OF STANDARDS, Washington, D.C.; F. W. Brown, Boulder, Colo.; Continuation of a Vertical-Incidence Antarctic Ionospheric Program; 2 years; $169,509
STANFORD UNIVERSITY, Stanford, Calif.; R. A. Hellwell; Continuation and Extension of "The Magnetic Phenomena in the Antarctic; 2 years; $70,274
R. A. Hellwell; Geomagnetic Latitude Control of VLF and ELF Phenomena; 1 year; $59,740
R. A. Hellwell; Study of Very Low Frequency Observations at South Pole and Byrd Stations; 1 year; $50,400

Meteorology

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Charles D. Keeling, Scripps Institution of Oceanography, La Jolla; Abundance of Carbon Dioxide in the Atmosphere in Antarctica; 2 years; $88,652
U.S. WEATHER BUREAU, Washington, D.C.; R. W. Reichelderffer; Antarctica Meteorological Research Program—1961; 10 months; $442,176
F. W. Reichelderffer; Atmospheric-Oceanic-Glaciologic Interaction in an Antarctic Interdisciplinary Research Program; 1 year; $59,950
F. W. Reichelderffer; International Antarctic Analysis Center, U.S. Participation; 1 year; $15,763

Oceanography

TEXAS A & M RESEARCH FOUNDATION, College Station, Tex.; Luis Capurro; Study of the Water Circulation of the South Atlantic and Antarctic; 1 year; $21,660
U.S. NAVY HYDROGRAPHIC OFFICE, Washington, D.C.; Wm. H. Littlewood; Ship-Based Oceanographic Studies in Antarctica and Subantarctic Regions; 18 months; $116,868
Ship-Based Seasonal Oceanographic Studies at McMurdo Sound; 2 years; $59,950

Polar Research Center

UNIVERSITY OF WISCONSIN, Madison, Wis.; G. P. Woollard; Establishment of a Polar and Geophysical Research Center at the University of Wisconsin; 1 year; $125,490

Related Scientific Support

ARCTIC INSTITUTE OF NORTH AMERICA, New York, N.Y.; Robert C. Taylor; Related Scientific Support of the U.S. Antarctic Research Program; 1 year; $169,927
L. G. HANSCOMB AIR FORCE BASE, Bedford, Mass.; A. P. Cray; For Travel and Per Diem; 1 year; $1,500
U.S. WEATHER BUREAU, Washington, D.C.; F. W. Reichelderffer; Antarctic Field Operations; 2 years; $65,977

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Station Seismology

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena; Hugo Benioff: Operation, Uptake, Replacement of South American Earth Station at Nana, Peru, and Santiago, Chile; 1 year; $6,756
Frank Press; Expansion Scientist With U.S. Antarctic Expedition; 1 year; $25,475

Frank Press; Operation of Wilkes Seismograph Station and Interpretation of Records for the Year 1961; 1 year; $6,500
COLUMBIA UNIVERSITY, New York, N.Y.; Jack Oliver; Conduct of Station Seismology Program—1961; 1 year; $1,044
U.S. COAST AND GEODETIC SURVEY, Washington, D.C.; H. A. Karo; Antarctic Seismological Observatories—1961; 2 years; $10,000

INTernational Geophysical Year

Aurora and Airglow
UNIVERSITY OF ALASKA: Operational Costs of Auroral Observations ___________________________ $3,500
NATIONAL BUREAU OF STANDARDS: Airglow Data Reduction in the International Geophysical Year... 8,500

Cosmic Rays
THE FRANKLIN INSTITUTE OF THE STATE OF PENNSYLVANIA: Data Reduction and Shipboard Neutron Monitor Station for the International Geophysical Year Cosmic Ray Program________ 8,000
NEW YORK UNIVERSITY: Studies of the Primary Cosmic Ray Spectrum __________________________ 870
Measurements of Neutrons of Solar Origin at High Altitudes______________________________ 822

Glaciology
ARCTIC INSTITUTE OF NORTH AMERICA: Antarctic Glaciology Personnel and Data Reduction____ 13,603
Data Reduction on McCall Glacier and Brooks Range_______________________________ 3,500
Study of Antarctic Glacial Geology _________________________________________ 2,055
THE OHIO STATE UNIVERSITY: Antarctic Data Reduction and Publication ________ 12,660

Gravity Measurements
ARCTIC INSTITUTE OF NORTH AMERICA: Antarctic Gravity Personnel__________________ 14,209

Ionospheric Physics
UNIVERSITY OF ALASKA: Ionospheric Absorption, Cosmic Noise Method____________________ 700
Operation of an Atmospheric Whistler Station in Alaska___________________________ 1,326
NATIONAL BUREAU OF STANDARDS: Operation of South American Ionospheric Sounding Stations________ 873
Ionospheric Quality Control and Training ________________________________________ 269

Ionospheric Data Processing and Publication in the International Geophysical Year Ionospheric Physics Program________________________ 2,000

Longitude and Latitude
U.S. COAST AND GEODETIC SURVEY: Longitude and Latitude Program in Hawaii____________ 4,100

Oceanography
COLUMBIA UNIVERSITY: Operations of Island Observatories ___________________________ 15,840
Operational Cost for Radiochemistry Analysis______________________________________ 381
TEXAS A & M RESEARCH FOUNDATION: Radiochemistry Analysis of Sea Water in the International Geophysical Year Oceanography Program in the Atlantic and the Gulf of Mexico__________________________ 4,583

Rocketry
OFFICE OF NAVAL RESEARCH: Provision of a Factory Trained Representative at Aerobee Firings__________________________ 5,202

Seismology
COLUMBIA UNIVERSITY: Seismic Measurements in the Atlantic ___________________________ 1,902
Operational Costs for Long Period Wave Studies_______________________________ 909

Solar Activity
NATIONAL BUREAU OF STANDARDS: Data Reductions and Publication in the International Geophysical Year Solar Activity Program__________________________ 5,000

World Days
NATIONAL BUREAU OF STANDARDS: Operation of AGEWARN and U.S. Regional Warning Centers in the International Geophysical World Days Program____________________________ 13,800

General Related Scientific Support
36 Travel Grants (see international travel for listing) 12th General Assembly International Union of Geodesy and Geophysics__________________________ 23,145
ARCTIC INSTITUTE OF NORTH AMERICA: Antarctic Scientific Field Supervision Costs__________________________ 670
NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL ICSU Support for International Geophysical Year Symposia__________________________ 5,378
Support of the International Geophysical Year Bulletin__________________________ 29,532
Support of the International Geophysical Year Documentary Film__________________________ 65,726
Support of International Geophysical Year Education__________________________ 19,455
Support of International Geophysical Year Documentation__________________________ 13,281
Support of the International Geophysical Year Annuals__________________________ 54,347

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Publication of International Geophysical Year Annals and Data Interchange
United States National Committee—International Geophysical Year Symposium

World Data Centers

UNIVERSITY OF ALASKA:
Archives in Archivo: 6,000
AMERICAN GEOGRAPHICAL SOCIETY:
Archives in Geology: 10,000
THE HIGH ALTITUDE OBSERVATORY OF THE UNIVERSITY OF COLORADO:
Archives in Solar Activity: 53,585
UNIVERSITY OF MINNESOTA:
Archives in Cosmic Rays: 17,000
OPERATION OF THE DATA COORDINATION OFFICE FOR THE WORLD DATA CENTER:
Rocket and Satellite World Data Center A: 1,080

UNIVERSITY OF ILLINOIS:
Archives of Standards:
Agricultural and Mechanical College of Texas:
Archives in Osmophysics: 10,000
U.S. WEATHER BUREAU:
Archives in Meteorology: 40,000

Heat and Water

COLUMBIA UNIVERSITY:
Correlation of Bottom Topography with Oceanic Parameters in the
Interdisciplinary Research Program of the International Geophysical Year: 10,200
Correlation of Volcanic Ash Layers in Deep-Sea Cores From the
Eastern Pacific in the Interdisciplinary Research Program of the IGY: 7,800
Analysis of Oceanographic and
Biologic Data Obtained During the
IGY in the Interdisciplinary Program:
Ohio State University:
Analysis of Geologic Data From the
Spitsbergen: 6,664
University of Washington:
Analysis of Heat Budget Data of
Station Alpha in the International Geophysical Year Interdisciplinary Research Program:
U.S. WEATHER BUREAU:
Interpretations of Meteorological and Solar-Cosmical Phenomena in the
Arctic Hemisphere: 21,927

Upper Atmosphere

UNIVERSITY OF MINNESOTA:
Charged Particle Orbits in the
Earth's Magnetic Field: 25,000
UNIVERSITY OF ILLINOIS:
Theoretical Studies of High Atmosphere Data in
the International Geophysical Year interdisciplinary Research Program:
Worldwide Mapping of Ionospheric
Data by Numerical Methods in
the International Geophysical Year Interdisciplinary Research Program:
Special Research
Carnegie Institute of Technology:
Special Research Surveys by Distinguished Scientists From Abroad: 80,000

Earth Satellite—Scientific Experiments

LINFIELD RESEARCH INSTITUTE:
Absolute Signal Strength and Frequency Measurements in the
International Geophysical Year Earth Satellite Program: 2,100
NATIONAL BUREAU OF STANDARDS:
Electron Density Profiles: 210
RESEARCH INSTITUTE FOR ADVANCED STUDY:
Development of Instrumentation for the Determination of the
Flux of Heavy Primary Cosmic Ray Nuclei in the IGY Earth Satellite Program: 14,500

SPECIALIZED FACILITIES

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.: L. R. Atwood: Construction of a Laboratory Addition for Animal Behavior Research: 2 years; $50,000
Mont A. Casler, Southwestern Research Station:
Station Portal, Ariz.; Construction of Housing Unit: 2 years; $17,750
BERMUDA BIOLOGICAL STATION FOR RESEARCH, Inc., Saint George's West, Bermuda; W. H. Sutcliffe, Jr.; Improvements and Additions to Research Facilities of the Bermuda Biological Station: 2 years; $111,000
BROWN UNIVERSITY, PROVIDENCE, R.I.: R. S. Rivlin; Establishment of a Computing Center: 2 years; $390,000
UNIVERSITY OF BUFFALO, Buffalo, N.Y.: Raymond E. Ewell; Purchase of Ancillary Research Reactor Equipment: 1 year; $150,235
CALIFORNIA INSTITUTE OF TECHNOLOGY,
Pasadena, Calif.; G. D. McCann; Digital Computing Facility; $66,500
UNIVERSITY OF CALIFORNIA, Berkeley, Calif.: Frank A. Beach; Establishment of a Field Station for Research in Animal Behavior: 3 years; $367,700
D. R. Parker, Riverside; Desert Research Station: 1 year; $15,000
Stanislav Vasilevska, Lick Observatory, Mount Hamilton; Equipment for Surveying and Automatic Measurement of Astrographic Plates: 2 years; $174,350
F. P. Zachelle, Davis; Construction of a Controlled Environment Chamber of New Design: 2 years; $17,400
CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburg, Pa.; Alan J. Perlis; Construction of a Computer: 3 years; $250,000
UNIVERSITY OF CHICAGO, Chicago, Ill.; H. B. Steinbach; Modernization of Whitman Laboratory of Zoology: 3 years; $60,000
CITY OF HOPE MEDICAL CENTER, Duarte, Calif.; W. D. Kaplan; Construction of Laboratory Facilities for Genetics Research: 1 year; $1,250
UNIVERSITY OF COLORADO, Boulder, Colo.; John W. Matt; Improvement of Road to Mount Evans Stations: 1 year; $11,650
COLUMBIA UNIVERSITY, New York, N.Y.; Charles F. Bonilla, Support of Nuclear Reactor Facility; 3 years; $247,700
COMMUNICATION RESEARCH INSTITUTE, Virginia Islands; John C. Lilly; Construction of

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a Communications Research Laboratory; 2 years; $21,000

CORNELL UNIVERSITY, Ithaca, N.Y.: Henry Dietrich; Cabinets for the Insect Collections of the Department of Entomology; 1 year; $25,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.: William J. Fry; Equipment for Ultrasonic Research Facility; 1 year; $69,000

Ross J. Martin; Assistance To Increase Reactor Research Capabilities; 1 year; $51,097.

UNIVERSITY OF KANSAS, Lawrence, Kansas: E. R. Hall; Construction of a Research Wing for the Museum of Natural History; 3 years; $317,500

Paul L. McGregor; Construction of an Experimental Greenhouse for Plant Taxonomy; 1 year; $69,000

UNIVERSITY OF MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.: T. J. Thompson; Equipment for MIT Reactor Project; 1 year; $235,340

MISSOURI BOTANICAL GARDEN, Saint Louis, Mo.: F. W. Went; Herbarium of the Department of Entomology; 1 year; $107,000

Peter Dohrn; Support of Basic Research for the study of Body Orientation and Motor Coordination; 2 years; $35,000

Pennsylvania State University, University Park, Pa.: Forrest J. Remick; Equipment for Expanding Basic Research in the Natural Engineering Sciences; 1 year; $165,126

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.: William E. Stephens; Acquisition of a 10 MEV Tandem Van De Graaff Accelerator; 2 years; $1,041,000

UNIVERSITY OF PITTSBURGH, Pittsburgh, Pa.: L. A. Cohen; Construction of a Laboratory for the Study of Body Orientation and Motor Coordination; 2 years; $35,000

William R. Kehl; New Computing Facility (IBM 7070); 2 years; $210,000

Princeton University, Princeton, N.J.: A. K. Parpurt; Installation of a Sea Water System for Biological Research; $11,500

ROCKY MOUNTAIN BIOLOGICAL LABORATORY, Crested Butte, Colo.; Robert K. Euders; Renovation of the Aquatic Room for Graduate and Plant Pathology; 2 years; $181,000

Rutgers, the State University, New Brunswick, N.J.; J. O. Lampen; Additions to Pilot Plant Facilities; 1 year; $40,000

STANFORD UNIVERSITY, Stanford, Calif.: John F. McManus; Laboratory for the Design and Development of Research Laboratories of the Department of Electrical Engineering; 1 year; $10,000

CORNELL UNIVERSITY, Ithaca, N.Y.; F. A. Long; Modification Two Rooms for Graduate Research in Organic and Physical Chemistry; 1 year; $5,100

John W. McManus; Atmospheric Control of Radiant Energy; 1 year; $5,000

Robert L. Sproull; Renovation of Graduate Research Laboratories in the Physics Building; 1 year; $7,800

Emory University, Atlanta, Ga.; E. E. Whipple; Improvement of Hood and Vent...
Add{t+on to the Meteorological Laboratories, University of Michigan, Ann Arbor, Mich.; Seymour L. Hess; Modernization of Graduate Research Laboratories in Meteorology; 1 year; $9,000

Florida State University, Tallahassee, Fla.; G. R. Noggle; Controlled Environment Chamber for Plant Research; 1 year; $5,000

University of Florida, Gainesville, Fla.; W. C. Hess; Renovation of Microbiology and Pharmacology Research Laboratories; 1 year; $16,750

Howard University, Washington, D.C.; H. E. Carter; Remodeling Program for Physical Chemistry; 1 year; $50,000

University of Illinois, Urbana, Ill.; L. D. Brown; Construction and Equipping Six Graduate Research Laboratories in the Attic of the Chemistry Building; 1 year; $13,500

University of Missouri, Columbia, Mo.; J. E. Skerrett; Modification of Graduate Research Laboratories; 1 year; $12,600

University of Notre Dame, Notre Dame, Ind.; E. H. Ludwig; Renovation and Furnishing for a Nutrition Laboratory; 1 year; $8,000

University of Oregon, Eugene, Ore.; H. J. Ensign; Construction of an Addition to the Meteorological Laboratories; 1 year; $19,250

University of Pennsylvania, Philadelphia, Pa.; M. J. Sinnott; Renovation of Graduate Research Laboratories; 1 year; $10,000

University of Minnesota, Minneapolis, Minn.; Bryce L. Crawford; Modernization of the Physical Chemistry Instrumental Research Laboratories; 1 year; $7,235

University of Nebraska, Lincoln, Nebr.; C. E. Georgi and R. E. Hill; Conversion of a Greenhouse to a Paleobotanical Research Laboratory; 1 year; $4,800

University of New Mexico, Albuquerque, N. Mex.; J. L. Rebsomer; Additional Research Facilities for Organic and Physical Chemistry; 1 year; $11,100

University of Notre Dame, Notre Dame, Ind.; G. F. D'Alelio; Conversion of Four Undergraduate Laboratories to Modern Graduate Laboratories; 1 year; $12,100

University of Oregon, Eugene, Ore.; Harry Alpert; Renovation and Improvement of Laboratories for Research in Biological and Physical Sciences; 1 year; $70,175

University of Pennsylvania, Philadelphia, Pa.; M. E. Fonske; Modernization of Graduate Research Laboratories; 1 year; $55,000

University of the Philippines, Quezon City; F. G. Moore; Modernization and Furnishing for a Nutrition Research Laboratory; 1 year; $2,000

University of Tennessee, Knoxville, Tenn.; J. W. Hall; Conversion of a Greenhouse to a Paleobotanical Research Laboratory; 1 year; $4,800

University of Wisconsin, Madison, Wis.; J. E. Skerrett; Modernization of Graduate Research Laboratories for Zoological Research; 1 year; $5,000

University of Wisconsin, Madison, Wis.; T. J. Smith; Addition of the Physical Chemistry Instrumental Research Laboratories; 2 years; $20,000

W. G. Shepherd; Modernization of Graduate Research Laboratories; 1 year; $21,500

D. D. Brown; Renovation of Zoological Research Laboratories; 1 year; $5,700

R. F. Smith; Modernization of Graduate Research Laboratories; 30 months; $40,600

Sid Robinson; Modernization of Animal Facilities; 1 year; $4,300

Iowa State University of Science and Technology, Ames, Iowa.; P. H. Carr and Daniel J. Zaffarano; Filling in Two Orem Courts With Research Rooms; 1 year; $40,000

Kansan State University of Agriculture and Applied Sciences, Manhattan, Kans.; Ralph G. Nevins; Construction of Graduate Research Laboratories; 1 year; $5,700

William E. Raville; Construction of a Graduate Research Laboratory; 1 year; $4,800

Kentucky Research Foundation, Lexington, Ky.; F. L. Yost; Expansion of Physics Research Laboratories; 1 year; $3,200

Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La.; H. B. Williams; Renovating and Air Conditioning a Graduate Research Microanalytical Laboratory and Research Instrument Room; 1 year; $22,600

Robert T. Wood; Provision of a Darkroom for Use in High Energy Physics; 1 year; $9,000

University of Michigan, Ann Arbor, Mich.; L. C. Anderson; Modernizing Eight Graduate Research Laboratories; 1 year; $20,000

D. E. Brown; Renovation of Zoology Research Laboratories; 1 year; $8,000

Stuart W. Churchill, Donald R. Mason and Brymer Williams; Renovation of Graduate Research Laboratories; 1 year; $11,100

W. H. Hein; Construction of an Addition to the Meteorological Laboratories; 1 year; $19,250

K. L. Jones; Renovation of Plant Physiology Research Laboratories; 1 year; $10,000

M. J. Sinnott; Renovation of Graduate Research Laboratories; 1 year; $1,500

James T. Wilson; Renovation and Construction of Graduate Research Laboratories in the Department of Geology; 1 year; $7,235

University of Minnesota, Minneapolis, Minn.; Bryce L. Crawford; Modernization of the Physical Chemistry Instrumental Research Laboratories; 1 year; $50,000

E. R. Eckert; Equipping a High Temperature Laboratory; 1 year; $7,500

Paul W. Gast; Expansion of Research Laboratories; 1 year; $2,500

J. W. Hall; Conversion of a Greenhouse to a Paleobotanical Research Laboratory; 1 year; $4,800

W. G. Shepherd; Additions to the Graduate Research Laboratories; 1 year; $21,500

N. T. Spratt, Jr.; Modernization of Graduate Laboratories for Zoological Research; 1 year; $5,000

F. M. Swain; Modification of Graduate Research Laboratories; 1 year; $8,000

Tibor Z. Zoltai; Modernization of X-Ray Laboratory in the Department of Geology and Mineralogy; 1 year; $6,050

University of Missouri, Columbia, Mo.; Warren R. Fleming; Renovation and Reconstruction of Zoological Research Laboratories; 2 years; $20,000

University of New Mexico, Albuquerque, N. Mex.; J. L. Rebsomer; Additional Research Facilities for Organic and Physical Chemistry; 1 year; $11,100

Eugene W. Rypka; Refurbishment of Laboratories for Microbiological Research; 1 year; $1,500

University of Notre Dame, Notre Dame, Ind.; G. F. D'Alelio; Conversion of Four Undergraduate Laboratories to Modern Graduate Laboratories; 1 year; $12,100

E. A. Peretti; Modernization of Graduate Research Laboratories; 1 year; $14,400

Ohio State University Research Foundation, Columbus, Ohio.; A. B. Garrett; Remodeling a Portion of McPherson Laboratory; 1 year; $55,000

University of Oklahoma Research Institute, Norman, Okla.; Robert H. Perry; Modernization of Graduate Research Facilities; 1 year; $6,700

University of Oregon, Eugene, Oreg.; Harry Alpert; Renovation and Improvement of Laboratories for Research in Biological and Physical Sciences; 1 year; $70,175

Pennsylvania State University, University Park, Pa.; M. E. Fonske; Modernization of Graduate Research Laboratories; 1 year; $9,500

K. E. Ludvig; Modernization and Furnishing of Virology and Tissue Culture Laboratories; 1 year; $12,500

K. L. Pike; Furnishings for a Nutrition Research Laboratory; 1 year; $2,000

University of Pennsylvania, Philadelphia,
Pa.; Norman Brown; Construction of a Laboratory for Electron Microscopy; 1 year; $6,600

Julius Halpern; Conversion of Storage Space for Research; 1 year; $12,000

S. Frye; Renovation and Construction of a Graduate Research Laboratory in the Moore School of Electrical Engineering; 1 year; $9,900

University of Pittsburgh, Pittsburgh, Pa.; Leonard A. Page; Renovation of the Low Energy Nuclear and Electron Physics Laboratory; 1 year; $13,700

G. A. Jeffrey; Renovation of Crystallography Laboratory; 1 year; $11,000

Piezoelectric Research Foundation, Lafayette, Ind.; Henry Kofler; Construction of Research Greenhouse; 1 year; $41,400

E. T. McBee; Furnishing and Finishing of Two Large Research Laboratories; 1 year; $43,800

RENSSLEAER POLYTECHNIC INSTITUTE, Troy, N.Y.; W. R. Bean; Construction of Electron Physics Laboratory; 1 year; $19,200

James R. Cloke; Modernizing Sixteen Graduate Research Laboratories; 1 year; $13,100

N. D. Greene; Modernization of a Laboratory for Graduate Research in Corrosion and Related Phenomena; 1 year; $5,200

RESEARCH FOUNDATION, OKLAHOMA STATE UNIVERSITY, Stillwater, Okla.; Clark A. Dunn; The Renovation and Modernization of the Chemical Engineering Graduate Research Laboratory; 1 year; $3,300

RICE INSTITUTE, Houston, Tex.; LeVan Griffin; Renovation and Construction of graduate Research Laboratory in Engineering; 1 year; $17,200

R. B. Turner; Modernizing Three Graduate Research Laboratories; 1 year; $14,000

ROCKEFELLER INSTITUTE, New York, N.Y.; Frank Brink, Jr.; Furnishing of Graduate Student Research Laboratories; 2 years; $32,250

UNIVERSITY OF ROCHESTER, Rochester, N.Y.; John W. Graham, Jr.; Modernization of Graduate Research Laboratories in the College of Engineering; 1 year; $59,300

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N.J.; J. B. Allison; Furnishings for Biological Research Laboratories; 2 years; $100,000

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; M. C. Kloetzel; Renovation of Bacteriology Research Laboratories; 1 year; $48,700

STANFORD UNIVERSITY, Stanford, Calif.; David M. Mason; Transport Processes Research Laboratory; 1 year; $8,000

Byrnie Perry; Small-Scale Fluid Mechanics Laboratory for Doctoral Research; 1 year; $2,500

Oliver Cutler Shepard; Construction of a Laboratory for a Radiocative Tracer Facility; 1 year; $3,200

STATE UNIVERSITY OF SOUTH DAKOTA, Vermillion, S. Dak.; F. E. Kelsey; Furnishings for Biochemistry and Pharmacology Research Laboratories; 1 year; $5,000

STEVENSON UNIVERSITY, Elgin, Ill.; John W. R. Fredrickson; Conversion of Unused Space into a Physics Research Laboratory; 1 year; $13,000

Henry E. Wirth; Renovation of Two Graduate Research Laboratories; 1 year; $11,300

TEXAS A & M RESEARCH FOUNDATION, College Station, Tex.; S. R. Wright; Development of a Graduate Research Laboratory; 1 year; $16,800

TYPUS UNIVERSITY, Medford, Mass.; M. Kent Wilson; Modification of an Old Laboratory To Provide a Modern Graduate Research Laboratory for Physical-Inorganic Chemistry Research and a Machine Shop for Research; 1 year; $12,500

TULANE UNIVERSITY OF LOUISIANA, New Orleans, La.; Eugene Copeland; Remodeling and Furnishing Biology Research Laboratories; 1 year; $9,900

VANDERBILT UNIVERSITY, Nashville, Tenn.; Leonard H. Beach; Improvement of New Research Space in Physics; 1 year; $7,700

Louis J. Birchner; Installation of New Rodes and Laboratory Benches in Six Laboratories for Organic, Inorganic and Analytical Research; 1 year; $7,700

R. B. Channell and E. Quarterman; Laboratory Renovation and Construction of a Greenhouse for Biological Research; 1 year; $11,800

R. R. Purdy; Furnishings for Research Laboratories of Departments of Anatomy, Biology, Biochemistry, Microbiology, and Physiology; 2 years; $110,000

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg, Va.; W. E. Engel; Construction of Research Laboratories for Biochemistry, Nutrition and Microbiology; 2 years; $22,700

WASHINGTON STATE UNIVERSITY, Pullman, Wash.; J. L. Culbertson; Modernizing of Five Graduate Research Laboratories for Organic Chemistry; 1 year; $9,100

J. I. Stokes and A. Hecht; Renovation and Furnishing for Two Graduate Research Laboratories; 1 year; $8,700

WASHINGTON UNIVERSITY, St. Louis, Mo.; H. N. Andrews, Jr.; Renovation and Furnishing of a Plant Histology Laboratory; 1 year; $1,000

UNIVERSITY OF WASHINGTON, Seattle, Wash.; E. E. Day and A. S. Kobayashi; Modernization of the Brittle Coating Research Laboratory; 1 year; $1,700

WAYNE STATE UNIVERSITY, Detroit, Mich.; George Coleman; Fixed Equipment for the Life Sciences Research Center; 1 year; $50,000

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; R. L. Frantz and N. Aldridge; Renovation of Primate Behavior Laboratory and Construction of Botanical Research Laboratory; 1 year; $11,250

Oliver Grummitt; Modernization of Graduate Level Research Laboratories; 1 year; $3,100

UNIVERSITY OF WISCONSIN, Madison, Wis.; L. A. Fraser; Renovation of Zoological Research Laboratories; 1 year; $9,800

Marion L. Jackson; Reconstruction of Two Rooms as Laboratories and Renovation of One Laboratory Room; 1 year; $7,450

Stephen C. Elcone; Modernization of Facilities for Graduate Mathematics Research; 1 year; $50,000

Julian E. Mack; Construction of a Spectroscopic Laboratory; 1 year; $6,000

University of Minnesota; K. Olson; Renovation of Veterinary Pathology Research Laboratories; 1 year; $6,000
P. C. Rosenthal; Modernization of Graduate Research Laboratories; 1 year; $13,400
J. F. Stauffer; Renovation of Botanic Research Greenhouses; 1 year; $9,700

GENERAL

BROWN UNIVERSITY, Providence, R.I.; Frederick G. Sherman; Purchase of Equipment for Basic Research in Biology; 1 year; $21,200

UNIVERSITY OF BUFFALO, Buffalo, N.Y.; Sidney Shulman; Short-Term Research by Medical Students; 3 years; $12,800

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; C. E. Zobell and G. O. Archenhus, Scripps Institution of Oceanography, La Jolla; An Electron Microscope for Research in Cell Biology; 2 years; $61,400

UNIVERSITY OF CHICAGO, Chicago, Ill.; L. T. Coggshall; Short-Term Research by Medical Students; 3 years; $25,920

COLLEGE OF MEDICAL EVANGELISTS, Loma Linda, Calif.; John Eric Peterson; Short-Term Research by Medical Students; 3 years; $8,940

COMISION NACIONAL DE ENERGIA ATOMICA, Buenos Aires, Argentina; Jorge A. Sabato; (1) Fabrication of Perfect Single Crystals of Alpha Uranium, and (2) Relationship between Physical and Mechanical Properties and Substructures in Uranium Metal; 6 months; $11,700

CORNELL UNIVERSITY, Ithaca, N.Y.; Lawrence W. Hanlon; Short-Term Research by Medical Students; 3 years; $21,600

Benjamin M. Stiegel; Research Training in Electron Microscopy; 5 years; $40,100

DUKE UNIVERSITY, Durham, N.C.; C. G. Bookhout, Duke University Marine Laboratory; Summer Research and Training at the Duke University Marine Laboratory; 3 years; $26,600

EMORY UNIVERSITY, Atlanta, Ga.; Arthur P. Richardson; Short-Term Research by Medical Students; 3 years; $17,280

Leland Shanor; Support of an Electron Microscope Facility for Research; 2 years; $42,200

UNIVERSITY OF GEORGIA, Athens, Ga.; Lawrence R. Pomeroy, The Marine Institute, Savannah; Equipment for Marine Biological Research at the University of Georgia Marine Institute; 1 year; $20,400

HARVARD UNIVERSITY, Cambridge, Mass.; Henry C. Meadow, Medical School, Boston; Short-Term Research by Medical Students; 3 years; $32,400

UNIVERSITY OF ILLINOIS, Urbana, Ill.; H. O. Halverson; Equipment for Basic Bacteriological Research; 2 years; $100,000

Milton Novak, Graduate College, Chicago; Short-Term Research by Medical Students; 3 years; $17,280

INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Richard C. Sturr; Culture Collection of Algae; 5 years; $34,600

JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; Thomas B. Turner; Short-Term Research by Medical Students; 3 years; $21,600

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; W. W. Fries; $22,000; Short-Term Research by Medical Students; 3 years; $12,960

MARINE BIOLOGICAL LABORATORY, Woods Hole, Mass.; Philip B. Armstrong; Research Laboratories in Marine Biology; 5 years; $177,800

MAYO ASSOCIATION, Rochester, Minn.; Joseph B. Berenson; Estimation Problems Bearing on Biological Problems; 2 years; $16,000

MEDICAL COLLEGE OF SOUTH CAROLINA, Charleston, S.C.; John T. Cattino; Short-Term Research by Medical Students; 3 years; $8,640

UNIVERSITY OF MIAMI, Coral Gables, Fla.; Lauren C. Gilman; Maintaining Type Cultures of Syngnathus Paramycium Caudatum; 3 years; $13,800

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; William N. Hubbard, Jr.; Short-Term Research by Medical Students; 3 years; $5,920

A. H. Stockard, University of Michigan Biological Station; Research at the University of Michigan Biological Station; 3 years; $51,000

UNIVERSITY OF MISSOURI, Columbia, Mo.; J. C. Thomas; Electron Microscope for Interdisciplinary Research Use; 1 year; $45,300

NATIONAL ACADEMY OF SCIENCES, Washington, D.C.; Harold J. Cootige; Pacific Science Research in the Galapagos Islands; 5 years; $84,000

NORTHERN ILLINOIS UNIVERSITY, Evanston, Ill.; Ray L. Watterson; Research Equipment; 1 year; $23,000

UNIVERSITY OF OKLAHOMA, Norman Okla.; Mark R. Everett, Oklahoma City; Short-Term Research by Medical Students; 3 years; $8,640

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Thomas F. Anderson; Support of a Program of Electron Microscopy; 5 years; $38,200

Julian B. Marsh; Short-Term Research by Medical Students; 3 years; $21,600

RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N.Y.; Davis G. Johnson, Syracuse; Short-Term Research by Medical Students; 3 years; $17,280

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; J. W. Bartholomew; An Electron Microscope for Biological Research; 1 year; $45,400

STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Norman B. Nelson; Short-Term Research by Medical Students; 3 years; $8,640

UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; Roland H. Alden, Memphis; Short-Term Research by Medical Students; 3 years; $15,120

UNIVERSITY OF WASHINGTON, Seattle, Wash.; Robert L. Fernand, Friday Harbor Laboratories; Research in Oceanography at the Friday Harbor Laboratories; 1 year; $4,000

WEST VIRGINIA UNIVERSITY, Morgantown, W. Va.; Edward J. Van Liere; Summer Courses in the Principles and Techniques of Tissue Culture; 2 years; $18,000

YALE UNIVERSITY, New Haven, Conn.; Vernon W. Lippard; Short-Term Research by Medical Students; 3 years; $32,400

J. C. Thomas; Electron Microscope Laboratory; Research Equipment for the Bingham Oceanographic Laboratory; 1 year; $14,500
## APPENDIX D

### Grants Other Than Research

**Education in the Sciences**

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Duration</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State University</td>
<td>Arizona</td>
<td>Tempe</td>
<td>Alan T. Wager</td>
<td>11 months</td>
<td>$274,500</td>
</tr>
<tr>
<td>Atlanta University</td>
<td>Georgia</td>
<td>Atlanta</td>
<td>K. A. Huggins</td>
<td>9 months</td>
<td>$251,400</td>
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<tr>
<td>Boston College</td>
<td>Massachusetts</td>
<td>Chestnut Hill</td>
<td>Stanley J. Smith</td>
<td>10 months</td>
<td>$222,900</td>
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<tr>
<td>Brigham Young University</td>
<td>Utah</td>
<td>Provo</td>
<td>Lane A. Compton</td>
<td>9 months</td>
<td>$274,500</td>
</tr>
<tr>
<td>Brown University</td>
<td>Rhode Island</td>
<td>Providence</td>
<td>Elmer R. Smith</td>
<td>12 months</td>
<td>$300,700</td>
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<tr>
<td>University of Georgia</td>
<td>Georgia</td>
<td>Athens</td>
<td>J. O. Westfall</td>
<td>9 months</td>
<td>$277,400</td>
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<tr>
<td>Iowa State Teachers College</td>
<td>Iowa</td>
<td>Cedar Falls</td>
<td>Robert A. Rogers</td>
<td>11 months</td>
<td>$305,700</td>
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<tr>
<td>University of Kansas</td>
<td>Kansas</td>
<td>Lawrence</td>
<td>Lee M. Sonneborn</td>
<td>9 months</td>
<td>$252,300</td>
</tr>
<tr>
<td>University of Kentucky</td>
<td>Kentucky</td>
<td>Lexington</td>
<td>Hugh H. Combs</td>
<td>12 months</td>
<td>$290,200</td>
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<tr>
<td>University of Minnesota</td>
<td>Minnesota</td>
<td>Minneapolis</td>
<td>Charles H. Hansen</td>
<td>11 months</td>
<td>$304,900</td>
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<tr>
<td>University of North Carolina</td>
<td>North Carolina</td>
<td>Chapel Hill</td>
<td>Edwin C. Markham</td>
<td>10 months</td>
<td>$294,500</td>
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<tr>
<td>University of Notre Dame</td>
<td>Indiana</td>
<td>Notre Dame</td>
<td>Arnold E. Ross</td>
<td>11 months</td>
<td>$228,500</td>
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<td>Oregon State College</td>
<td>Oregon</td>
<td>Corvallis</td>
<td>John C. Swanson</td>
<td>9 months</td>
<td>$260,600</td>
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<tr>
<td>Pennsylvania State University</td>
<td>Pennsylvania</td>
<td>University Park</td>
<td>William H. Powers</td>
<td>9 months</td>
<td>$272,400</td>
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<tr>
<td>University of Pennsylvania</td>
<td>Pennsylvania</td>
<td>Philadelphia</td>
<td>William D. Arnold</td>
<td>9 months</td>
<td>$251,400</td>
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<td>University of Puerto Rico</td>
<td>Puerto Rico</td>
<td>Rio Piedras</td>
<td>Mariano Garcia</td>
<td>9 months</td>
<td>$110,800</td>
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<tr>
<td>San Diego State College</td>
<td>California</td>
<td>San Diego</td>
<td>John E. Eagleson</td>
<td>12 months</td>
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<tr>
<td>Stanford University</td>
<td>California</td>
<td>Stanford</td>
<td>Harold M. Bacon</td>
<td>9 months</td>
<td>$278,400</td>
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<tr>
<td>State University of South Dakota</td>
<td>South Dakota</td>
<td>Vermillion</td>
<td>S. Dak.</td>
<td>11 months</td>
<td>$312,500</td>
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<tr>
<td>Syracuse University Research Institute</td>
<td>New York</td>
<td>Syracuse</td>
<td>Alfred T. Collette</td>
<td>10 months</td>
<td>$288,900</td>
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<tr>
<td>University of Texas</td>
<td>Texas</td>
<td>Austin</td>
<td>Robbin C. Anderson</td>
<td>11 months</td>
<td>$297,400</td>
</tr>
<tr>
<td>Tuskegee Institute</td>
<td>Alabama</td>
<td>Tuskegee</td>
<td>W. Edward Belton</td>
<td>9 months</td>
<td>$260,600</td>
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<tr>
<td>University of Utah</td>
<td>Utah</td>
<td>Salt Lake City</td>
<td>Thomas J. Parmley</td>
<td>12 months</td>
<td>$309,300</td>
</tr>
<tr>
<td>University of Virginia</td>
<td>Virginia</td>
<td>Charlottesville</td>
<td>James W. Cole</td>
<td>11 months</td>
<td>$290,400</td>
</tr>
<tr>
<td>Washington University</td>
<td>Missouri</td>
<td>St. Louis</td>
<td>E. U. Condon</td>
<td>9 months</td>
<td>$278,100</td>
</tr>
<tr>
<td>University of Wisconsin</td>
<td>Wisconsin</td>
<td>Madison</td>
<td>Donald H. Bucklin</td>
<td>12 months</td>
<td>$305,700</td>
</tr>
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### ACADEMIC YEAR INSTITUTES FOR HIGH SCHOOL TEACHERS

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Duration</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard University</td>
<td>Massachusetts</td>
<td>Cambridge</td>
<td>Francis Keppel</td>
<td>9 months</td>
<td>$325,500</td>
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<tr>
<td>University of Illinois</td>
<td>Illinois</td>
<td>Urbana</td>
<td>Joseph Landin</td>
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<tr>
<td>Ohio State University</td>
<td>Ohio</td>
<td>Columbus</td>
<td>John S. Richardson</td>
<td>9 months</td>
<td>$312,200</td>
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### IN-SERVICE INSTITUTES FOR COLLEGE TEACHERS

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Duration</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Oklahoma</td>
<td>Oklahoma</td>
<td>Norman</td>
<td>Richard V. Andree</td>
<td>9 months</td>
<td>$21,015</td>
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### IN-SERVICE INSTITUTES FOR HIGH SCHOOL TEACHERS

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Duration</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adelphi College</td>
<td>New York</td>
<td>Garden City</td>
<td>Abe Shenitzer</td>
<td>9 months</td>
<td>$28,080</td>
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<tr>
<td>University of Akron</td>
<td>Ohio</td>
<td>Akron</td>
<td>Roger F. Keller</td>
<td>9 months</td>
<td>$5,280</td>
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<tr>
<td>Alabama College</td>
<td>Alabama</td>
<td>Montevallo</td>
<td>Paul C. Bailey</td>
<td>9 months</td>
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<tr>
<td>University of Alabama</td>
<td>Alabama</td>
<td>Tuscaloosa</td>
<td>Ralph L. Chermock</td>
<td>9 months</td>
<td>$21,080</td>
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<tr>
<td>Albertus Magnus College</td>
<td>Connecticut</td>
<td>New Haven</td>
<td>Florence D. Jacobson</td>
<td>8 months</td>
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<tr>
<td>Albright College</td>
<td>Pennsylvania</td>
<td>Reading</td>
<td>Richard J. Kohlmeier</td>
<td>9 months</td>
<td>$4,270</td>
</tr>
<tr>
<td>Alfred University</td>
<td>New York</td>
<td>Alfred</td>
<td>E. Gordon Ogden</td>
<td>8 months</td>
<td>$9,450</td>
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<tr>
<td>American University</td>
<td>Washington</td>
<td>D.C.</td>
<td>Leo Schubert</td>
<td>9 months</td>
<td>$20,370</td>
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<tr>
<td>Arizona State College</td>
<td>Arizona</td>
<td>Flagstaff</td>
<td>Agnes M. Allen</td>
<td>9 months</td>
<td>$11,220</td>
</tr>
<tr>
<td>Arizona State University</td>
<td>Arizona</td>
<td>Tempe</td>
<td>Ernest E. Snyder</td>
<td>9 months</td>
<td>$10,440</td>
</tr>
</tbody>
</table>
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Henry G. Jacob, Jr.; 9 months; $12,460
LOYOLA UNIVERSITY, New Orleans, La.; F. A. Bennett; 9 months; $9,810
MANHATTAN COLLEGE, New York, N.Y.; Luke V. Titone; 9 months; $10,750

Bernard Alfred Welch; 9 months; $10,870

MILLSaps STATE COLLEGE, College Park, Md.; Howard Laster; 9 months; $19,440
MCNEE05 STATE COLLEGE, Lake Charles, La.; S. M. Spencer; 9 months; $5,750
MISsISSIPPI COLLEGE, Clinton, Miss.; R. D. Boswell, Jr.; 8 months; $12,230

McNeil University, Coral Gables, Fla.; J. H. Curties; 9 months; $12,230
Mississippi College, Clinton, Miss.; Archie H. Gernsby; 9 months; $16,840
Mississippi State University, College, Miss.; R. D. Boswell, Jr.; 8 months; $13,860
MISSOURI BOTANICAL GARDEN, Saint Louis, Mo.; Norton H. Nickerson; 9 months; $5,560
UNTIVERSITY OF MISSOURI, Columbia, Mo.; Harold Q. Fuller; 8 months; $5,080
Montclair State College, Upper Montclair, N.J.; Max A. Soile, 10 months; $6,150
Montclair State College, Upper Montclair, N.J.; William A. Urecheto; 8 months; $6,640
MunlCIPAL UNIVERSITY OF OMAHA, Omaha, Neb.; Merle E. Brooks; 9 months; $16,850
Murray State College, Murray, Ky.; Alfre000 Rexburg, Idaho; Merle R. Brooks; 9 months; $7,700
NEBRASKA WESLEYAN UNIVERSITY, Lincoln, Neb.; Walter R. French, Jr.; 8 months; $5,200
University of Nebraska, Lincoln, Nebr.; James A. Rutledge, University High School; 9 months; $8,240
University of Nevada, Reno, Nev.; E. M. Beasley; 10 months; $14,860
Newport School of Engineering Research Foundation, Newport, N.Y.; Henry Zaszek; 9 months; $5,820
University of New Hampshire, Durham, N.H.; M. Evans Muntor; 9 months; $7,720
New York State Society for Medical Research, Inc., New York, N.Y.; Albert S. Kuperman; New York University; 9 months; $5,100
New York University, New York, N.Y.; Morris Klene; 10 months; $17,840
Mills College, Oakland, Calif.; M. H. Shambaugh; 8 months; $5,890
L. E. Spock; 8 months; $7,400
North Carolina State College of Agriculture and Engineering, Raleigh, N.C.; H. V. Park; 9 months; $5,540
University of North Carolina, Chapel Hill, N.C.; William A. White; 9 months; $8,510
Northeast Missouri State Teachers College, Kirksville, Mo.; Dean A. Rosserby; 9 months; $7,950
Northern Texas State College, Denton, Tex.; Robert C. Sherman; 8 months; $8,300
Northern Michigan College, Marquette, Mich.; Holmes Boynton; 8 months; $12,500
Northern Illinois College, Ashland, Wis.; Jesse M. Caskey; 9 months; $11,470
Northwestern State College, Alva, Okla.; Joe W. Melton; 9 months; $9,180
Northwestern University, Evanston, Ill.; E. H. C. Hindebrandt; 9 months; $9,100
Ohio Wesleyan University, Wooster, Ohio; William R. Riley; 9 months; $7,480
University of Oklahoma, Norman, Okla.; Richard V. Andree; 9 months; $3,500
Oregon State College, Corvallis, Oreg.; Albert R. Poole; 9 months; $3,500

University of Oregon, Eugene, Oreg.; A. F. Moursund; 8 months; $3,870
Pace College, New York, N.Y.; Edward Ritter; 8 months; $6,280
Pan American College, Edinburg, Tex.; Sidney B. Dreger; 9 months; $11,870
Pennsylvania State University, University Park, Pa.; William H. Powers; 9 months; $22,880
University of Pennsylvania, Philadelphia, Pa.; J. E. Hazel; 9 months; $11,700
University of Pittsburgh, Pittsburgh, Pa.; Peter Gray; 8 months; $7,780
David Halliday; 8 months; $7,840
John C. Knipp; 8 months; $8,520
Prairie View Agricultural and Mechanical College, Prairie View, Tex.; E. E. O'Banlon; 9 months; $16,640
University of Puerto Rico, Rio Piedras, P.R.; Virgilio Biaggi, Jr.; Mayaguez; 9 months; $15,660
Augusto Bobonli; 9 months; $1,260
Augusto Bobonli; 9 months; $14,400
Juan D. Curet; 9 months; $12,700
Fordham University, Lafayette, Ind.; M. J. Willkowsky; 9 months; $11,300
University of Redlands, Redlands, Calif.; Paul R. Gleason; 8 months; $9,460
Teachers College, Columbia University, New York, N.Y.; Howard F. Fehr; 8 months; $8,100
Tibachirs College, Columbus, Ohio; William C. Doyle; 9 months; $5,800
Rutgers, The State University, New Brunswick, N.J.; Emory P. Stark; 9 months; $11,670
Reed College, Portland, Oreg.; Arthur H. Livermore; 9 months; $13,840
Research Foundation of State University of New York, Albany, N.Y.; F. Reese Nevin, College of Education at Plattsburgh; 10 months; $9,790
Ricks College, Rexburg, Idaho; Merle R. Fisher; 8 months; $7,100
University of Rochester, Rochester, N.Y.; John J. Montef; 8 months; $8,330
John J. Montef; 8 months; $6,320
John J. Montef; 8 months; $8,610
Rockhurst College, Kansas City, Mo.; William C. Doyle; 9 months; $5,800
Rutgers, The State University, New Brunswick, N.J.; Emory P. Stark; 9 months; $11,670
Edward J. Coaan; 9 months; $17,960
Sacramento State College Foundation, Sacramento, Calif.; H. Stewart Moredock; 9 months; $20,880
St. Louis University, Saint Louis, Mo.; John J. Andrews; 9 months; $3,370
St. Peter's College, Jersey City, N.J.; Frank J. McMackin; 9 months; $9,450
University of San Francisco, San Francisco, Calif.; Edward J. Farrell; 9 months; $6,430
San Jose State College, San Jose, Calif.; Max Kramer; 9 months; $12,950
Laurence E. WilIon; 9 months; $5,550
University of Santa Clara, Santa Clara, Calif.; Irving Sussman; 9 months; $23,800
Sarah Lawrence College, Bronxville, N.Y.; Edward J. Cogan; 8 months; $1,000
Edward J. Cogan; 8 months; $17,860
University of Scranton, Scranton, Pa.; Joseph A. Rock, S.J.; 9 months; $5,590
Joseph A. Rock, S.J.; 9 months; $3,950
Shorter College, Rome, Ga.; Emma Lovejoy; 9 months; $16,800
Smith College, Northampton, Mass.; Kenneth W. Sherl; 0 months; $30,150
South Carolina State College, Orange-
burg, S.C.; George W. Hunter; 9 months; $30,470

University of South Carolina, Columbia, S.C.; A. P. French; 9 months; $14,670

Southern College of Theology, Durham, Okla.; Leslie A. Dwight; 9 months; $5,120

Ernest Starch, Jr.; 9 months; $5,050

Southern University and Agricultural and Mechanical College, Baton Rouge, La.; Russell M. Ampey; 9 months; $14,940

Southwestern Louisiana Institute, Lafayette, La.; James R. Oliver; 9 months; $25,380

State Teachers College, Salem, Mass.; Thomas I. Ryan; 8 months; $12,030

Southern University of South Dakota, Vermillion, S. Dak.; Theodore L. Reid; 9 months; $20,800

Stevens Institute of Technology, Hoboken, N.J.; Robert H. Sassy; 9 months; $17,700

Temple University, Philadelphia, Pa.; Lawrence Muldawer; 9 months; $15,800

Tennessee Agricultural and Industrial State University, Nashville, Tenn.; William N. Jackson; 9 months; $17,620

Texas Woman's University, Denton, Tex.; E. J. Knapp, Texas Western College of the University of Texas, El Paso; 9 months; $5,500

University of Texas, Austin, Tex.; E. J. Knapp, Texas Western College of the University of Texas, El Paso; 9 months; $5,500

University of Toledo, Toledo, Ohio; Archie N. Solberg; 9 months; $12,210

Tougaloo Southern Christian College, Tougaloo, Miss.; A. A. Branch; 8 months; $18,800

Union College and University, Schenectady, N.Y.; C. W. Graves; 8 months; $14,100

Union University, Jackson, Tenn.; Ralph T. Donnell; 9 months; $3,930

Utah State University of Agriculture and Applied Science, Logan, Utah; Joe Ellich; 9 months; $10,080

John K. Wood; 9 months; $7,060

University of Utah, Salt Lake City, Utah; E. Allan Davis; 9 months; $7,670

University of Virginia, Charlottesville, Va.; William C. Lowty; 9 months; $13,689

Wabash College, Wabash, Ind.; Luther B. Wright; 9 months; $2,120

Wabash College, Wabash, Ind.; B. McIlwaine; 9 months; $36,000

Wake Forest College, Winston-Salem, N.C.; Ben M. Seelbinder; 9 months; $6,380

Washington University, St. Louis, Mo.; Arthur D. Welander; 4 months; $1,200

Wayne State University, Detroit, Mich.; Karl W. Folley; 8 months; $11,000

William V. Mayer; 8 months; $8,520

West Virginia University, Morgantown, W. Va.; I. Dee Peters; 9 months; $4,440

Western Kentucky State College, Bowling Green, Ky.; Ward C. Sumpter; 9 months; $12,580

Western Michigan University, Kalamazoo, Mich.; George G. Mallinson; 9 months; $12,000

Western Reserve University, Cleveland, Ohio; Stefan Machul; 9 months; $9,120

Western Washington College of Education, Bellingham, Wash.; Marie E. Pabst; 8 months; $5,870

Wilkes College, Wilkes-Barre, Pa.; Thomas R. Richards; 9 months; $4,650

William Jewell College, Liberty, Mo.; Wallace A. Hilton; 9 months; $11,400

Wisconsin State College, Eau Claire, Wis.; Lawrence F. Walsstrom; 9 months; $12,040

Woman's College of the University of

North Carolina, Greensboro, N.C.; Hollis J. Rogers; 9 months; $21,050

Worcester Polytechnic Institute, Worcester, Mass.; Richard F. Morton; 9 months; $5,270

Yale University, New Haven, Conn.; Stuart R. Brinkley; 8 months; $14,610

Yeshiva University, New York, N.Y.; A. Gelbart; 9 months; $49,900

Youngstown University, Youngstown, Ohio; Clair L. Worley; 9 months; $7,620

IN-SERVICE INSTITUTES FOR ELEMENTARY SCHOOL TEACHERS AND ADMINISTRATORS

American Museum of Natural History, New York, N.Y.; Franklin M. Branley; 5 months; $2,710

University of Arizona, Tucson, Ariz.; Arthur H. Steinbrenner; 9 months; $5,530

Bemidji State College, Bemidji, Minn.; Richard E. Butzol; 9 months; $6,250

East Texas State College, Commerce, Tex.; Roy N. Jervis; 9 months; $5,830

Iowa State Teachers College, Cedar Falls, Iowa; Flenadine Gibb; 7 months; $5,200

Lincoln University Teachers College, Emporia, Kan.; Ted F. Andrews; 9 months; $6,520

Millersville State College, Millersville, Pa.; William B. McIlwaine; 9 months; $5,200

Northern Illinois University, De Kalb, Ill.; Eugene W. Hellmich; 9 months; $5,810

Northwestern University, Evanston, Ill.; E. H. C. Hildebrandt; 8 months; $5,610

Oregon State College, Corvallis, Oreg.; Albert L. Leland; 9 months; $5,750

Saint Joseph College, West Hartford, Conn.; Sister Maria Clare Markham; 9 months; $5,480

San Jose State College Corporation, San Jose, Calif.; John L. Marks; 9 months; $5,250

Texas Woman's University, Denton, Tex.; Dixie Young; 9 months; $5,000

SUMMER INSTITUTES FOR COLLEGE TEACHERS

American University, Washington, D.C.; Leo Schubert; 6 weeks; $45,350

Arizona State University, Tempe, Ariz.; Gordon L. Bender; 6 weeks; $39,700

Bucknell University, Lewisburg, Pa.; Charles Hestin Coder, Jr.; 6 weeks; $44,000

University of California, Berkeley, Calif.; John W. Green; Los Angeles; 8 weeks; $66,000

George Jurka; 7 weeks; $22,600

Clemson College, Clemson, S.C.; Robert W. Moorman; 8 weeks; $53,500

Colorado State University Research Foundation, Fort Collins, Colo.; Milton E. Bender; 10 weeks; $63,800

University of Colorado, Boulder, Colo.; Robert W. Pennak; 6 weeks; $44,900

Emory University, Atlanta, Ga.; William H. Jones; 9 weeks; $43,660

University of Florida, Gainesville, Fla.; Herbert A. Meyer; 6 weeks; $50,100

Fort Lewis Agricultural and Mechanical College, Durango, Colo.; Herbert D. Hart; 5 weeks; $58,000

Indiana University, Bloomington, Ind.; Wayne R. Lowell; 6 weeks; $31,400
<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Department</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Institute of Technology</td>
<td>MA</td>
<td>Cambridge, Mass.</td>
<td>Gordon L. Brownell</td>
<td>6 weeks</td>
<td>$29,000</td>
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<tr>
<td>IOWA</td>
<td>IA</td>
<td>Iowa City</td>
<td>Titus Carr Evans</td>
<td>8 weeks</td>
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<tr>
<td>Kansas State College of Pittsburg</td>
<td>KS</td>
<td>Pittsburg, Kan.</td>
<td>Leon C. Heckert</td>
<td>8 weeks</td>
<td>$51,500</td>
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<tr>
<td>Massachusetts Institute of Technology</td>
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<td>Cambridge, Mass.</td>
<td>Melvin A. Nobile</td>
<td>8 weeks</td>
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<tr>
<td>Cornell University</td>
<td>NY</td>
<td>Ithaca, N.Y.</td>
<td>Russell N. Bradt</td>
<td>8 weeks</td>
<td>$101,875</td>
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<tr>
<td>University of Michigan</td>
<td>MI</td>
<td>Ann Arbor</td>
<td>Melvin Levine</td>
<td>6 weeks</td>
<td>$59,950</td>
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<tr>
<td>University of Oregon</td>
<td>OR</td>
<td>Eugene, Oreg.</td>
<td>Richard C. Castenhols</td>
<td>6 weeks</td>
<td>$14,500</td>
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<td>University of Tennessee</td>
<td>TN</td>
<td>Knoxville, Tenn.</td>
<td>George K. Schwietzer</td>
<td>4 weeks</td>
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<td>Tulane University of Louisiana</td>
<td>LA</td>
<td>New Orleans, La.</td>
<td>John K. Hampton, Jr.</td>
<td>8 weeks</td>
<td>$27,500</td>
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<tr>
<td>Pennsylvania State University</td>
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<td>University Park, Pa.</td>
<td>Arthur A. Welander</td>
<td>8 weeks</td>
<td>$44,200</td>
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<tr>
<td>Temple University</td>
<td>PA</td>
<td>Philadelphia, Pa.</td>
<td>Eimer L. Offenbacher</td>
<td>8 weeks</td>
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</tr>
<tr>
<td>Adelphi College</td>
<td>NY</td>
<td>Garden City, N.Y.</td>
<td>Howard A. Robinson</td>
<td>6 weeks</td>
<td>$80,450</td>
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<tr>
<td>University of California, Berkeley</td>
<td>CA</td>
<td>Berkeley, Calif.</td>
<td>Charles L. Trimplet</td>
<td>6 weeks</td>
<td>$58,350</td>
</tr>
<tr>
<td>Clark University</td>
<td>MA</td>
<td>Worcester, Mass.</td>
<td>Charles T. Bumer</td>
<td>6 weeks</td>
<td>$54,900</td>
</tr>
<tr>
<td>Florida State University of Agriculture and Technical College</td>
<td>FL</td>
<td>Tallahassee, Fla.</td>
<td>Charles W. Edington</td>
<td>8 weeks</td>
<td>$18,000</td>
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<tr>
<td>University of Hawaii, Honolulu</td>
<td>HI</td>
<td>Honolulu, Hawaii</td>
<td>Sidney C. Halio</td>
<td>6 weeks</td>
<td>$13,000</td>
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<tr>
<td>Oklahoma State University</td>
<td>OK</td>
<td>Stillwater, Okla.</td>
<td>Albert V. Logan</td>
<td>6 weeks</td>
<td>$48,800</td>
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<td>Oregon State College</td>
<td>OR</td>
<td>Corvallis, Oreg.</td>
<td>Robert H. Seavy</td>
<td>6 weeks</td>
<td>$39,900</td>
</tr>
<tr>
<td>University of California, Berkeley</td>
<td>CA</td>
<td>Berkeley, Calif.</td>
<td>Edward L. Trimplet</td>
<td>6 weeks</td>
<td>$58,350</td>
</tr>
<tr>
<td>University of Missouri</td>
<td>MO</td>
<td>Columbia, Mo.</td>
<td>Charles T. Burner</td>
<td>6 weeks</td>
<td>$54,000</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>MI</td>
<td>Ann Arbor</td>
<td>Melvin Levine</td>
<td>8 weeks</td>
<td>$19,500</td>
</tr>
<tr>
<td>New York University</td>
<td>NY</td>
<td>New York, N.Y.</td>
<td>Joseph D. Gettler</td>
<td>8 weeks</td>
<td>$51,700</td>
</tr>
<tr>
<td>North Carolina State College of Agriculture and Engineering</td>
<td>NC</td>
<td>Raleigh, N.C.</td>
<td>H. F. Robinson</td>
<td>6 weeks</td>
<td>$41,400</td>
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<tr>
<td>University of North Carolina, Chapel Hill</td>
<td>NC</td>
<td>Chapel Hill, N.C.</td>
<td>H. D. Crockford</td>
<td>6 weeks</td>
<td>$28,125</td>
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<tr>
<td>University of Oregon</td>
<td>OR</td>
<td>Eugene, Oreg.</td>
<td>Richard C. Castenhols</td>
<td>6 weeks</td>
<td>$14,500</td>
</tr>
<tr>
<td>Reed College</td>
<td>OR</td>
<td>Portland, Oreg.</td>
<td>Kenneth E. Van Engen</td>
<td>8 weeks</td>
<td>$29,000</td>
</tr>
<tr>
<td>University of Washington</td>
<td>WA</td>
<td>Seattle, Wash.</td>
<td>George W. Anderson</td>
<td>6 weeks</td>
<td>$36,000</td>
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<tr>
<td>Rutgers, the State University</td>
<td>NJ</td>
<td>New Brunswick, N.J.</td>
<td>Arthur P. Starke</td>
<td>6 weeks</td>
<td>$29,100</td>
</tr>
<tr>
<td>University of North Carolina</td>
<td>NC</td>
<td>Chapel Hill, N.C.</td>
<td>H. D. Crockford</td>
<td>6 weeks</td>
<td>$101,875</td>
</tr>
<tr>
<td>University of Southern California</td>
<td>CA</td>
<td>Los Angeles, Calif.</td>
<td>D. Victor Steed</td>
<td>6 weeks</td>
<td>$44,800</td>
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<tr>
<td>University of Texas at Austin</td>
<td>TX</td>
<td>Austin, Tex.</td>
<td>Lionel B. Clapp</td>
<td>9 weeks</td>
<td>$39,400</td>
</tr>
<tr>
<td>University of California</td>
<td>CA</td>
<td>Berkeley, Calif.</td>
<td>Edward L. Trimplet</td>
<td>6 weeks</td>
<td>$58,350</td>
</tr>
<tr>
<td>Clark University</td>
<td>MA</td>
<td>Worcester, Mass.</td>
<td>Charles T. Bumer</td>
<td>6 weeks</td>
<td>$54,900</td>
</tr>
</tbody>
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**SUMMER INSTITUTES FOR HIGH SCHOOL TEACHERS**

<table>
<thead>
<tr>
<th>Institution</th>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Department</th>
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<tr>
<td>Adelphi College</td>
<td>NY</td>
<td>Garden City, N.Y.</td>
<td>Howard A. Robinson</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Agricultural and Technical College of North Carolina</td>
<td>NC</td>
<td>Greensboro, N.C.</td>
<td>Gerald A. Edwards</td>
<td>6 weeks</td>
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<tr>
<td>Agricultural and Mechanical College of Texas</td>
<td>TX</td>
<td>College Station, Tex.</td>
<td>Coleman M. Loyd</td>
<td>12 weeks</td>
</tr>
<tr>
<td>Alabama College</td>
<td>AL</td>
<td>Montevallo, Ala.</td>
<td>Paul C. Bailey</td>
<td>6 weeks</td>
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<tr>
<td>University of Alabama</td>
<td>AL</td>
<td>University, Ala.</td>
<td>Charles K. Arey</td>
<td>11 weeks</td>
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<tr>
<td>University of Alaska, College, Alaska</td>
<td>AK</td>
<td>Fairbanks, Alaska</td>
<td>William R. Cashen</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Allegheny College</td>
<td>PA</td>
<td>Meadville, Pa.</td>
<td>Robert E. Bugbee</td>
<td>7 weeks</td>
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</table>
AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; C. Bruce Hunter; 4 weeks; $14,100

AMERICAN UNIVERSITY, Washington, D.C.; Leo Schubert; 5 weeks; $65,100

AMERICAN UNIVERSITY, College Park, Maryland; Raymond L. Libby; 6 weeks; $51,000

APPALACHIAN STATE TEACHERS COLLEGE, Boone, N.C.; I. W. Carpenter, Jr.; 6 weeks; $43,100

ARIZONA STATE COLLEGE, Flagstaff, Ariz.; Agnes M. Allen; 8 weeks; $59,300

UNIVERSITY OF ARIZONA, Tucson, Ariz.; Millard G. Seeley; 7 weeks; $78,700

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; Bruce R. Vogeli; 6 weeks; $54,460

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; Bruce R. Vogeli; 6 weeks; $54,460

BROWN UNIVERSITY, Providence, R.I.; Elmer R. Smith; 6 weeks; $61,400

BURLINGTON-SOUTHERN COLLEGE, Burlington, Ind.; Wiley S. Rogers; 8 weeks; $71,000

BOSTON COLLEGE, Chestnut Hill, Mass.; Stanley J. Beuzeska, S.J.; 6 weeks; $52,626

BOWDOIN COLLEGE, Brunswick, Maine; Samuel E. Kemmerling; 6 weeks; $36,400

BOWDOIN COLLEGE, Brunswick, Maine; Samuel E. Kemmerling; 6 weeks; $36,400

BOWDOIN COLLEGE, Brunswick, Maine; Samuel E. Kemmerling; 6 weeks; $36,400

BOWDOIN COLLEGE, Brunswick, Maine; Samuel E. Kemmerling; 6 weeks; $36,400

BOWDOIN COLLEGE, Brunswick, Maine; Samuel E. Kemmerling; 6 weeks; $36,400

BOWLING GREEN STATE UNIVERSITY, Bowling Green, Ohio; Bruce R. Vogeli; 5 weeks; $41,200

BRADLEY UNIVERSITY, Peoria, Ill.; A. Wayne McGuire; 6 weeks; $41,700

BROWN UNIVERSITY, Providence, R.I.; Elmer R. Smith; 8 weeks; $58,800

BUCKNELL UNIVERSITY, Lewisburg, Pa.; Lester Kleff; 6 weeks; $62,500

UNIVERSITY OF BUFFALO, Buffalo, N.Y.; Harriet F. Montague; 6 weeks; $47,300

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; F. E. Hiacet; Los Angeles; 6 weeks; $95,100

RAYMOND L. LIBBY; Los Angeles; 6 weeks; $48,300

CARLOTON COLLEGE, Northfield, Minn.; Robert T. Mathews; 6 weeks; $45,500

ARLID J. MILLER; 6 weeks; $47,200

FRANK E. WOLF; 6 weeks; $48,300

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Paul E. Guenther; 6 weeks; $52,300

CATHOLIC UNIVERSITY OF PUERTO RICO, Santa Maria, P.R.; Joseph W. Stander; 6 weeks; $33,800

CENTRAL CONNECTICUT STATE COLLEGE, New Britain, Conn.; Kenneth G. Fuller; 6 weeks; $48,400

CENTRAL MICHIGAN UNIVERSITY, Mt. Pleasant, Mich.; Lestor H. Seiler; 6 weeks; $50,300

Lester H. Seiler; 6 weeks; $49,800

CENTRAL MISSOURI STATE COLLEGE, Warrensburg, Mo.; Sam P. Hewitt; 6 weeks; $72,600

UNIVERSITY OF CHATTANOOGA, Chattanooga, Tenn.; J. Horace Coulliette; 7 weeks; $69,300

CHICO STATE COLLEGE FOUNDATION, Chico, Calif.; Robbins S. King; 6 weeks; $91,600

CLAFLIN COLLEGE, Orangeburg, S.C.; Hampton D. Smith, Sr.; 9 weeks; $78,800

CLARKSON COLLEGE OF TECHNOLOGY, Potsdam, N.Y.; F. Gordon Lindsey; 8 weeks; $78,200

CLARKSON COLLEGE, Potsdam, N.Y.; Floyd I. Brownley, Jr.; 6 weeks; $56,300

COLBY COLLEGE, Waterville, Maine; Evans B. Reid; 6 weeks; $79,900

COLORADO STATE COLLEGE, Greeley, Colo.; John A. Bed; 8 weeks; $62,900

UNIVERSITY OF COLORADO, Boulder, Colo.; Charles R. Bitter; 7 weeks; $40,900

UNIVERSITY OF THE PACIFIC, Stockton, Calif.; Herschel Frye; 10 weeks; $75,100

COLORADO STATE COLLEGE, Greeley, Colo.; John A. Bed; 8 weeks; $62,900

UNIVERSITY OF COLORADO, Boulder, Colo.; Charles R. Bitter; 7 weeks; $40,900

John M. Cleveland; 8 weeks; $53,900

Newell Younggren; 6 weeks; $47,200

COLUMBIA UNIVERSITY, Columbia, S.C.; Philip E. Graef; 8 weeks; $51,600

UNIVERSITY OF CONNECTICUT, Storrs, Conn.; David J. Biek; 6 weeks; $79,400

CONVERSE COLLEGE, Spartanburg, S.C.; Walter James Wyatt; 8 weeks; $78,900

CORNELL UNIVERSITY, Ithaca, N.Y.; R. William Shaw; 6 weeks; $54,200

DAVIS AND ELKHORN COLLEGE, Hanover, N.H.; Richard S. Pieters; 7 weeks; $75,525

UNIVERSITY OF DELAWARE, Newark, Del.; John A. Brown; 8 weeks; $37,000

UNIVERSITY OF DENVER, Denver, Colo.; Earl A. Eisen; 9 weeks; $74,900

DEPAUL UNIVERSITY, Chicago, Ill.; Willis B. Caton; 6 weeks; $25,200

DEPAUL UNIVERSITY, Chicago, Ill.; Willis B. Caton; 6 weeks; $25,200

DEPAUL UNIVERSITY, Chicago, Ill.; Willis B. Caton; 6 weeks; $25,200

Lyle E. Mehlenbacker; 6 weeks; $41,000

DAKE UNIVERSITY, Des Moines, Iowa; B. E. Gillam; 8 weeks; $46,500

Duke University, Durham, N.C.; Lewis E. Anderson; 6 weeks; $115,400

Donald J. Fluke; 8 weeks; $19,900

DePAUL UNIVERSITY, Des Moines, Iowa; B. E. Gillam; 8 weeks; $46,500

DONALD J. FLUKE; 8 weeks; $19,900

Thomas D. Reynolds; 9 weeks; $134,100

EASTERN ILLINOIS UNIVERSITY, Charleston, Ill.; Wolden N. Baker; 8 weeks; $76,400

EASTERN MICHIGAN UNIVERSITY, Ypsilanti, Mich.; James M. Barlow; 6 weeks; $60,200

EASTERN NEW MEXICO UNIVERSITY, Portales, N. Mex.; Ruth B. Thomas; 8 weeks; $61,300

EASTERN WASHINGTON COLLEGE, Johnson City, Tenn.; Douglas G. Nicholson; 8 weeks; $73,300
EAST TEXAS STATE COLLEGE, Commerce, Tex.; Roy N. Jervis; 6 weeks; $33,300
EMMANUEL MISSIONARY COLLEGE, Berrien Springs, Mich.; Harold T. Jones; 8 weeks; $42,200
EMORY UNIVERSITY, Atlanta, Ga.; Trevor Emery; $50,400
FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; Dwight B. Goodner; 8 weeks; $51,300
Dwight B. Goodner; 8 weeks; $55,200
FORDHAM UNIVERSITY, New York, N.Y.; Frederick L. Carvan, S.J.; 6 weeks; $49,800
Henry F. DeBajis; 6 weeks; $49,800
Henry F. DeBajis; 6 weeks; $49,800
FORT HAYS KANSAS STATE COLLEGE, Hays, Kans.; W. T. Olson; 8 weeks; $45,000
FRANKLIN AND MARSHALL COLLEGE, Lancaster, Pa.; Bernard Jacobson; 6 weeks; $47,600
GEORGE WASHINGTON CARVER FOUNDATION OF NORMAL AND APPLIED SCIENCE, New York, N.Y.; James F. Martinson; 8 weeks; $101,200
GEORGE WASHINGTON UNIVERSITY, Washington, D.C.; Trevor Whitehead; 8 weeks; $48,900
T. H. Whitehead; 9 weeks; $68,700
GRAMBLING COLLEGE, Grambling, La.; Archibald L. Lacey; 8 weeks; $44,500
HAMILTON COLLEGE, Clinton, N.Y.; Brewster H. Gere; 6 weeks; $47,600
HAMILTON UNIVERSITY OF HAWAII, Honolulu, Hawaii; Albert J. Bernatowice; 6 weeks; $38,300
HUNTER COLLEGE OF THE CITY OF NEW YORK, New York, N.Y.; Jewel1 Hughes Bushey; 6 weeks; $48,190
HOWARD PATNE COLLEGE, Brownwood, Tex.; Leonard R. Daniel; 6 weeks; $48,400
HOWARD UNIVERSITY, Washington, D.C.; Marlee C. Taylor; 8 weeks; $49,400
HUMBOLDT STATE COLLEGE, Arcata, Calif.; E. Charlie Parke; 6 weeks; $60,700
HUBER COLLEGE OF THE CITY OF NEW YORK, New York, N.Y.; Jewell Hughes Bushby; 6 weeks; $47,400
UNIVERSITY OF IDAHO, Moscow, Idaho; K. A. Bush; 8 weeks; $49,600
Edgar H. Grahn; 8 weeks; $74,200
Edgar H. Grahn; 8 weeks; $94,200
ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Halm Reingold; 8 weeks; $41,200
ILLINOIS STATE NORMAL UNIVERSITY, Normal, Ill.; C. F. McMorris; 8 weeks; $50,700
ILLINOIS WESLEYAN UNIVERSITY, Bloomington, Ill.; Wayne W. Wntland; 8 weeks; $70,700
UNIVERSITY OF ILLINOIS, Urbana, Ill.; Max Reberder; 8 weeks; $31,700
Roger K. Brown; 8 weeks; $61,500
Peter E. Yankwich; 8 weeks; $63,200
INDIANA UNIVERSITY, Bloomington, Ind.; Robert B. Fischer; 8 weeks; $50,900
Shelby D. Gerking; 6 weeks; $51,800
L. S. McClung; 4 weeks; $21,600
Elvie J. Wilson; 8 weeks; $87,500
LOYOLA UNIVERSITY OF CHICAGO, Chicago, Ill.; James H. M. Henderson; 8 weeks; $64,900
L. S. McClung; 4 weeks; $16,600
L. 8. McClung; 4 weeks; $21,600
MARSHALL FOUNDATION, INC., Huntington, W. Va.; Donald C. Martin; 11 weeks; $76,700
Donald C. Martin; 11 weeks; $77,800
UNIVERSITY OF MARYLAND, College Park, Md.; Joshua R. C. Brown; 7 weeks; $83,800
Joshua R. C. Brown; 7 weeks; $84,825
MEMPHIS STATE UNIVERSITY, Memphis, Tenn.; J. W. Fox; 8 weeks; $66,800
H. S. Kaltenborn; 8 weeks; $83,400
MIAMI UNIVERSITY, Oxford, Ohio; Bruce V. Wiedner; 8 weeks; $66,200
MICHIGAN COLLEGE OF MINING AND TECHNOLOGY, Houghton, Mich.; Donald G. Yerg; 8 weeks; $45,800
MICHIGAN STATE UNIVERSITY, East Lansing, Mich.; Donald G. Yerg; 8 weeks; $45,800
MISCELLANEOUS INSTITUTIONS, Minneapolis, Minn.; William H. Marshall; 5 weeks; $20,400
Francis A. Sperrell; 6 weeks; $14,500
Frank Verburgweg; 8 weeks; $105,900
MINNESOTA STATE COLLEGE, East Pittsburg, Pittsburg, Calif.; B. O. Van Hook; 8 weeks; $103,200
INTERAMERICAN UNIVERSITY OF PUERTO RICO, San Germán, P.R.; Ismael Veit; 7 weeks; $49,200
IOWA STATE TEACHERS COLLEGE, Cedar Falls, Iowa; Irwin Brune; 8 weeks; $99,600
IOWA STATE UNIVERSITY OF SCIENCE AND INDUSTRY, Des Moines, Iowa; J. L. Hirlisch; 6 weeks; $59,200
Orlando C. Kreider; 8 weeks; $90,900
JOHNS HOPKINS UNIVERSITY, Baltimore, Md.; William Keilo Morrill, Sr.; 6 weeks; $74,500
KANSAS STATE COLLEGE OF PITTSPBURG, Pittsburg, Kansas; R. G. Smith; 8 weeks; $83,200
KANSAS STATE TEACHERS COLLEGE, Emporia, Kansas; Otto M. Smith; 8 weeks; $250,100
KANSAS STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, Manhattan, Kansas; J. R. Chelkowski; 8 weeks; $54,800
Leonard E. Fuller; 8 weeks; $88,700
UNIVERSITY OF KANSAS, Lawrence, Kansas; Edward L. Shaw; 8 weeks; $79,200
KENT STATE UNIVERSITY, Kent, Ohio; Kenneth B. Cummins; 8 weeks; $66,200
KNOX COLLEGE, Galesburg, Ill.; Herbert Priestley; 6 weeks; $51,200
Rothwell Stephens; 6 weeks; $50,700
LAPAYETTE COLLEGE, Le Roy, Pa.; Fred Y. Roeder; 6 weeks; $32,800
LEHIGH UNIVERSITY, Bethlehem, Pa.; H. R. Gault; 6 weeks; $57,200
LARGO COMMUNITY COLLEGE, Farmville, Va.; Blanche C. Desselle; 8 weeks; $116,500
LOUISIANA POLYTECHNIC INSTITUTE, Ruston, La.; John A. Moore; 9 weeks; $69,100
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, La.; Hulen B. Williams; 9 weeks; $54,200
Hulen B. Williams; 9 weeks; $72,100
LOYOLA UNIVERSITY OF LOS ANGELES, Los Angeles, Calif.; Berthold R. Wicker; 6 weeks; $35,900
MACALESTER COLLEGE, SAINT PAUL, Minn.; Russell B. Hastings; 8 weeks; $72,100
UNIVERSITY OF MAIN, Orono, Maine; C. C. H. Kaltenborn; 6 weeks; $48,100
MARQUETTE UNIVERSITY, Milwaukee, Wis.; Clarence F. Dineen; 6 weeks; $36,900
L. J. Holder; 6 weeks; $34,700
MARRIOTT FOUNDATION, INC., Huntington, W. Va.; Donald C. Martin; 11 weeks; $76,700
Donald C. Martin; 11 weeks; $77,800
UNIVERSITY OF MARYLAND, College Park, Md.; Joshua R. C. Brown; 7 weeks; $83,800
Joshua R. C. Brown; 7 weeks; $84,825
MEMPHIS STATE UNIVERSITY, Memphis, Tenn.; J. W. Fox; 8 weeks; $66,800
H. S. Kaltenborn; 8 weeks; $83,400
MIAMI UNIVERSITY, Oxford, Ohio; Bruce V. Wiedner; 8 weeks; $66,200
MICHIGAN STATE UNIVERSITY, East Lansing, Mich.; Donald G. Yerg; 8 weeks; $45,800
MICHIGAN STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, Houghton, Mich.; Donald G. Yerg; 8 weeks; $45,800
MINNESOTA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, St. Paul, Minn.; William H. Marshall; 5 weeks; $20,400
Francis A. Sperrell; 6 weeks; $14,500
Frank Verburgweg; 8 weeks; $105,900
MINNESOTA STATE COLLEGE, East Pittsburg, Pittsburg, Calif.; B. O. Van Hook; 8 weeks; $103,200
OHIO UNIVERSITY, Athens, Ohio; L. P. Eberly; 6 weeks; $31,300

MONTCLAIR STATE COLLEGE, Upper Montclair, N.J.; Max A. Sobel; 6 weeks; $73,500

MOREHEAD STATE COLLEGE, Morehead, Ky.; William B. Owensley; 8 weeks; $61,200

MORGAN STATE COLLEGE, Baltimore, Md.; Thomas P. Frasier; 6 weeks; $55,100

MURRAY STATE COLLEGE FOUNDATION, Murray, Ky.; Alfred Wolfson; Murray State College; 8 weeks; $30,800

UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; John E. McMullin; 8 weeks; $39,300

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Frank C. Gentry; 8 weeks; $52,400

NEW MEXICO STATE UNIVERSITY, Las Vegas, N. Mex.; James P. Zietlow; 8 weeks; $59,300

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Frank C. Gentry; 8 weeks; $52,400

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N.C.; Edward A. Cameron; 6 weeks; $104,100

VICTOR A. GREULACH; 6 weeks; $88,400

NORTH DAKOTA STATE COLLEGE, Fargo, N. Dak.; F. L. Mindear; 8 weeks; $93,700

UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; F. L. Mindear; 8 weeks; $93,700

NORTH CAROLINA STATE COLLEGE, Winston-Salem, N.C.; Robert C. Sherman; 6 weeks; $47,200

NORTHWESTERN ILLINOIS UNIVERSITY, DeKalb, Ill.; Martin W. Reinhart; 8 weeks; $62,600

FREDERICK W. ROLF; 8 weeks; $64,300

NORTHERN ILLINOIS COLLEGE, Marquette, Mich.; Horace H. Bliss; 10 weeks; $58,200

NORTHERN ILLINOIS UNIVERSITY, Freeport, Ill.; Victor A. Greulach; 8 weeks; $88,400

NORTHWESTERN ILLINOIS UNIVERSITY, DeKalb, Ill.; Martin W. Reinhart; 8 weeks; $62,600

NORTHERN ILLINOIS UNIVERSITY, Freeport, Ill.; Horace H. Bliss; 10 weeks; $58,200

NORTHWESTERN UNIVERSITY, Evanston, Ill.; E. H. C. Hildebrandt; 8 weeks; $94,200

NORTHWESTERN UNIVERSITY, Evanston, Ill.; E. H. C. Hildebrandt; 8 weeks; $94,200

NORTHWESTERN UNIVERSITY, Notre Dame, Ind.; Emil T. Hofman; 7 weeks; $57,400

EMIL T. HOFMAN; 7 weeks; $71,400

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, Oak Ridge, Tenn.; Ralph T. Overtman; 4 weeks; $51,800

OHIO STATE UNIVERSITY, Columbus, Ohio; John S. Richardson; 8 weeks; $124,700

OHIO UNIVERSITY, Athens, Ohio; L. P. Eberly; 6 weeks; $57,700

OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; Robert A. Roberts; 6 weeks; $38,000

OLIVER L. HUBBARD; 6 weeks; $38,000

OHIO UNIVERSITY, Athens, Ohio; Robert A. Roberts; 6 weeks; $38,000

LOREN D. POTTER; 9 weeks; $19,300

LOREN D. POTTER; 9 weeks; $19,300

PHILIP D. WINTER; 6 weeks; $57,700

PHILIP D. WINTER; 6 weeks; $57,700

PENN STATE UNIVERSITY, University Park, Pa.; William H. Powers; 8 weeks; $105,400

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; William H. Powers; 8 weeks; $105,400

RANDOLPH-MACON WOMAN'S COLLEGE, Lynchburg, Va.; Paul A. Walker; 8 weeks; $80,400

RUTGERS THE STATE UNIVERSITY, New Brunswick, N.J.; Alan A. Boyden; 6 weeks; $38,500

RUTGERS THE STATE UNIVERSITY, New Brunswick, N.J.; Alan A. Boyden; 6 weeks; $38,500

RUTGERS THE STATE UNIVERSITY, New Brunswick, N.J.; Alan A. Boyden; 6 weeks; $38,500

RUTGERS THE STATE UNIVERSITY, New Brunswick, N.J.; Alan A. Boyden; 6 weeks; $38,500

SACRAMENTO STATE COLLEGE FOUNDATION, Sacramento, Calif.; Carl E. Ludwig, Sacramento State College; 8 weeks; $82,600

SAINT AUGUSTINE'S COLLEGE, Raleigh, N.C.; President; 8 weeks; $50,600

SAINT AUGUSTINE'S COLLEGE, Raleigh, N.C.; President; 8 weeks; $50,600

SAINT AUGUSTINE'S COLLEGE, Raleigh, N.C.; President; 8 weeks; $50,600

SAINT LOUIS UNIVERSITY, St. Louis, Mo.; Theo. A. Ashford; 6 weeks; $28,500

FRANCIS REAGAN; 6 weeks; $48,100
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<tr>
<th>Institution</th>
<th>City</th>
<th>State</th>
<th>President</th>
<th>Term</th>
<th>Salary</th>
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<tr>
<td>San Jose State College Corp., San Jose, Calif.</td>
<td>San Jose, Calif.</td>
<td>Calif.</td>
<td>John L. Marks</td>
<td>6 weeks</td>
<td>$48,500</td>
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<tr>
<td>Charles E. Smith, Jr.</td>
<td></td>
<td></td>
<td></td>
<td>6 weeks</td>
<td>$40,700</td>
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<tr>
<td>Seattle University, Seattle, Wash.</td>
<td></td>
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<td>Ernie P. Bertin, S.J.</td>
<td>8 weeks</td>
<td>$75,900</td>
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<td>Seton Hall College, Greensburg, Pa.</td>
<td></td>
<td>Pennsylvania</td>
<td>Sister Mary Thedious</td>
<td>8 weeks</td>
<td>$42,100</td>
</tr>
<tr>
<td>Simmons College, Boston, Mass.</td>
<td></td>
<td></td>
<td>Philip M. Hillman</td>
<td>8 weeks</td>
<td>$61,400</td>
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<tr>
<td>Temple University, Philadelphia, Pa.</td>
<td></td>
<td></td>
<td>Elmer L. Offenbacher</td>
<td>8 weeks</td>
<td>$87,900</td>
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<tr>
<td>David S. Sarner</td>
<td></td>
<td></td>
<td></td>
<td>6 weeks</td>
<td>$50,400</td>
</tr>
<tr>
<td>Tennessee Agricultural and Industrial State University, Nashville, Tenn.</td>
<td>Nashville, Tenn.</td>
<td></td>
<td>Rughenford H. Adkins</td>
<td>8 weeks</td>
<td>$51,600</td>
</tr>
<tr>
<td>Texas Christian University, Forth Worth, Tex.</td>
<td></td>
<td>Texas</td>
<td>Ben F. Goldbeck</td>
<td>6 weeks</td>
<td>$91,400</td>
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<td>Texas Technological College, Lubbock, Tex.</td>
<td></td>
<td>Texas</td>
<td>Earl L. Camp</td>
<td>9 weeks</td>
<td>$86,300</td>
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<td>Texas Southern University, Houston, Tex.</td>
<td></td>
<td>Texas</td>
<td>Robert J. Terry</td>
<td>12 weeks</td>
<td>$93,800</td>
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<td>Texas Woman's University, Denton, Tex.</td>
<td></td>
<td>Texas</td>
<td>Harold T. Baker</td>
<td>6 weeks</td>
<td>$47,400</td>
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<tr>
<td>Texas University of Austin, Tex.</td>
<td></td>
<td>Texas</td>
<td>William P. Bents</td>
<td>6 weeks</td>
<td>$55,400</td>
</tr>
<tr>
<td>South Dakota School of Mines and Technology, Rapid City, S. Dak.</td>
<td>Rapid City, S. Dak.</td>
<td>South Dakota</td>
<td>Howard C. Williams</td>
<td>8 weeks</td>
<td>$83,426</td>
</tr>
<tr>
<td>South Dakota State College, Brookings, S. Dak.</td>
<td></td>
<td></td>
<td>Leslie A. Dwight</td>
<td>8 weeks</td>
<td>$46,500</td>
</tr>
<tr>
<td>Southeastern State College, Durant, Okla.</td>
<td></td>
<td></td>
<td>William F. Sullivan</td>
<td>6 weeks</td>
<td>$27,200</td>
</tr>
<tr>
<td>Springfield, Mo.</td>
<td></td>
<td></td>
<td></td>
<td>6 weeks</td>
<td>$27,200</td>
</tr>
<tr>
<td>Northwestern Illinois University, Carbondale, Ill.</td>
<td></td>
<td>Illinois</td>
<td>W. C. McDaniel</td>
<td>3 weeks</td>
<td>$49,800</td>
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<tr>
<td>Southern Illinois University, Carbondale, Ill.</td>
<td></td>
<td>Illinois</td>
<td>I. L. Shechemester</td>
<td>8 weeks</td>
<td>$46,500</td>
</tr>
<tr>
<td>Southern Methodist University, Dallas, Tex.</td>
<td></td>
<td>Texas</td>
<td>Joe P. Harris, Jr.</td>
<td>6 weeks</td>
<td>$30,600</td>
</tr>
<tr>
<td>Southern University, Baton Rouge, La.</td>
<td></td>
<td>Louisiana</td>
<td>J. Warren Lee</td>
<td>8 weeks</td>
<td>$55,000</td>
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<tr>
<td>Southeast Missouri State College</td>
<td></td>
<td>Missouri</td>
<td></td>
<td>8 weeks</td>
<td>$48,800</td>
</tr>
<tr>
<td>Springfield, Mo.</td>
<td></td>
<td></td>
<td></td>
<td>6 weeks</td>
<td>$27,200</td>
</tr>
<tr>
<td>Northwestern Louisiana Institute, LaFayette, La.</td>
<td></td>
<td>Louisiana</td>
<td>James R. Oliver</td>
<td>9 weeks</td>
<td>$55,400</td>
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<td>Southwestern State College, Weatherford, Okla.</td>
<td></td>
<td>Oklahoma</td>
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<td>9 weeks</td>
<td>$55,400</td>
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<td>Spring Hill College, Mobile, Ala.</td>
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<td>Alabama</td>
<td>Francis J. Boyd, Jr.</td>
<td>6 weeks</td>
<td>$40,400</td>
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<td>Stanford University, Stanford, Calif.</td>
<td></td>
<td>California</td>
<td>Harold M. Bacon</td>
<td>6 weeks</td>
<td>$47,250</td>
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<tr>
<td>Paul Kirkpatrick</td>
<td></td>
<td></td>
<td></td>
<td>6 weeks</td>
<td>$40,500</td>
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<td>State Teachers College, California, Pa.</td>
<td></td>
<td>California</td>
<td>Gabriel F. Betz</td>
<td>9 weeks</td>
<td>$55,400</td>
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<td>State University of Iowa, Iowa City, Iowa</td>
<td></td>
<td>Iowa</td>
<td>Titus Carr Evans</td>
<td>8 weeks</td>
<td>$19,770</td>
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<tr>
<td>State University of Southern California, Los Angeles, Calif.</td>
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<td></td>
<td>6 weeks</td>
<td>$84,200</td>
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<td>Aaron R. Olber</td>
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<td></td>
<td>8 weeks</td>
<td>$77,800</td>
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<td>Stephen F. Austin State College, Nacogdoches, Tex.</td>
<td></td>
<td>Texas</td>
<td>Alvin F. Shinn</td>
<td>6 weeks</td>
<td>$25,700</td>
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<tr>
<td>Michigan State University, De Land, Fla.</td>
<td></td>
<td>Florida</td>
<td>Gene W. Medlin</td>
<td>8 weeks</td>
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<tr>
<td>Stevens Institute of Technology, Hoboken, N.J.</td>
<td></td>
<td>New Jersey</td>
<td>Robert H. Seavy</td>
<td>8 weeks</td>
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<td>Syracuse University, Syracuse, N.Y.</td>
<td></td>
<td>New York</td>
<td>John G. Burdick</td>
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<tr>
<td>William R. Frederickson</td>
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<td></td>
<td>6 weeks</td>
<td>$79,800</td>
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<td>Western Michigan University, Kalamazoo, Mich.</td>
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<td>Michigan</td>
<td>George M. Mullicon</td>
<td>8 weeks</td>
<td>$48,100</td>
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<td>Western Reserve University, Cleveland, Ohio</td>
<td></td>
<td>Ohio</td>
<td>Ralph H. Petrucci</td>
<td>11 weeks</td>
<td>$129,900</td>
</tr>
<tr>
<td>Western Texas State College, Carbondale, Tex.</td>
<td></td>
<td>Texas</td>
<td>Hollis L. Cook</td>
<td>12 weeks</td>
<td>$85,100</td>
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<tr>
<td>Western Virginia University, Morgantown, W. Va.</td>
<td></td>
<td>Virginia</td>
<td>James B. Hickman</td>
<td>6 weeks</td>
<td>$92,900</td>
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<tr>
<td>Workman Institute, Tuskegee Institute, Ala.</td>
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<td></td>
<td>7 weeks</td>
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<tr>
<td>Virginia Polytechnic Institute, Blacksburg, Va.</td>
<td></td>
<td>Virginia</td>
<td>Robert C. Krug</td>
<td>8 weeks</td>
<td>$54,000</td>
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<tr>
<td>Virginia State College, Petersburg, Va.</td>
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<td>Virginia</td>
<td>Richard H. Dunn</td>
<td>8 weeks</td>
<td>$100,300</td>
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<td>University of Virginia, Charlottesville, Va.</td>
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<td>James W. Cole, Jr.</td>
<td>8 weeks</td>
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<td>Western State University, Pullman, Wash.</td>
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<td>Washington</td>
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<tr>
<td>Alfred B. Butler</td>
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<td>8 weeks</td>
<td>$76,800</td>
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<tr>
<td>Vanderbilt University, Nashville, Tenn.</td>
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<td>E. Baylas Shanks</td>
<td>8 weeks</td>
<td>$110,400</td>
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<td>University of Vermont and State Agricultural College, Burlington, Vt.</td>
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<td>N. James Schoottomaker</td>
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<td>Virginia Polytechnic Institute, Blacksburg, Va.</td>
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<td>Virginia</td>
<td>Robert C. Krug</td>
<td>8 weeks</td>
<td>$54,000</td>
</tr>
<tr>
<td>Virginia State College, Petersburg, Va.</td>
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<td>Virginia</td>
<td>Richard H. Dunn</td>
<td>8 weeks</td>
<td>$100,300</td>
</tr>
<tr>
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<td>Virginia</td>
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</tr>
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<td>Virginia</td>
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<td>8 weeks</td>
<td>$100,300</td>
</tr>
<tr>
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<td></td>
<td>Ohio</td>
<td>Ralph H. Petrucci</td>
<td>11 weeks</td>
<td>$129,900</td>
</tr>
<tr>
<td>Western Texas State College, Carbondale, Tex.</td>
<td></td>
<td>Texas</td>
<td>Hollis L. Cook</td>
<td>12 weeks</td>
<td>$85,100</td>
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<tr>
<td>Howard University, Morgantown, W. Va.</td>
<td></td>
<td>Virginia</td>
<td>James B. Hickman</td>
<td>6 weeks</td>
<td>$92,900</td>
</tr>
</tbody>
</table>

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WEST VIRGINIA WESTLEY COLLEGE, Buckhannon, W. Va.; John C. Wright; 6 weeks; $10,000

UNIVERSITY OF WICHITA, Wichita, Kans.; Charles G. Stuckwein; 6 weeks; $27,000

WILLIAM JEWELL COLLEGE, Liberty, Mo.; Frank G. Edson; 5 weeks; $76,100

WISCONSIN STATE COLLEGE, River Falls, Wis.; Richard J. Delorit; 8 weeks; $59,000

WISCONSIN STATE COLLEGES, State Capitol, Madison, Wis.; Eugene R. McPhie; 6 weeks; $42,200

UNIVERSITY OF WISCONSIN, Madison, Wis.; Robert A. Jaggard; 6 weeks; $46,735

PETER J. Salaman; Milwaukee; 6 weeks; $39,400

WITTEBEN UNIVERSITY, Springfield, Ohio; Everett H. Bush; 8 weeks; $44,100

WOMAN'S COLLEGE OF THE UNIVERSITY OF NORTH CAROLINA, Greensboro, N. C.; Hollis J. Rogers; 6 weeks; $46,200

WORCESTER POLYTECHNIC INSTITUTE, Worchester, Mass.; 8 weeks; $800

UNIVERSITY OF WYOMING, Laramie, Wyo.; Carl A. Cinnamon; 8 weeks; $19,000

Palmer O. Steen; 8 weeks; $76,300

XAVIER UNIVERSITY, Cincinnati, Ohio; John B. Hart; 6 weeks; $38,800

YALE UNIVERSITY, New Haven, Conn.; Stuart R. Brinkley; 6 weeks; $57,300

Dirk Brouwer; 6 weeks; $58,425

SUMMER INSTITUTES FOR ELEMENTARY SCHOOL TEACHERS AND ADMINISTRATORS

COLLEGE OF ST. CATHERINE, St. Paul, Minn.; Sister Seraphim; 6 weeks; $34,400

DEPAUW UNIVERSITY, Greencastle, Ind.; Donald J. Cook; 6 weeks; $28,500

UNIVERSITY OF KANSAS, Lawrence, Kans.; Robert W. Ridgway; 5 weeks; $31,800

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Joseph N. Payne; 4 weeks; $27,700

NORTHERN ILLINOIS UNIVERSITY, DeKalb, III.; Frederick W. Rolf; 8 weeks; $49,900

NORTHERN MICHIGAN COLLEGE, Marquette, Mich.; Henry S. Helmonen; 6 weeks; $37,700

UNIVERSITY OF RHODE ISLAND, Kingston, R. I.; Palmer A. Palmier; 8 weeks; $31,500

RUTGERS, THE STATE UNIVERSITY, New Brunswick, N. J.; Guido G. Wiegand; 6 weeks; $38,100

SAN FERNANDO VALLEY STATE COLLEGE FOUNDATION, Northridge, Calif.; Ruth L. Roche; 6 weeks; $37,700

SAN JOSE STATE COLLEGE CORPORATION, San Jose, Calif.; James R. Smart; 6 weeks; $36,600

UNIVERSITY OF SOUTH CAROLINA, Columbia, S. C.; Frederick H. Giles, Jr.; 3 weeks; $27,700

SOUTHERN UNIVERSITY, Baton Rouge, La.; Woodrow H. Jones; 8 weeks; $31,500

TEACHERS COLLEGE, Columbia University, New York, N. Y.; Frederick L. Fitzpatrick; 6 weeks; $37,700

UNIVERSITY OF TEXAS, Austin, Tex.; W. T. Guy, Jr.; 6 weeks; $31,400

SUMMER CONFERENCES

AMERICAN UNIVERSITY, Washington, D. C.; Matthew F. Norton; Summer Conference in Stratigraphy and Structure of the Appalachian for College Teachers of Geology and Earth Sciences; 14 days; $17,800

BUTLER UNIVERSITY, Indianapolis, Ind.; Ralph K. Birdwhistell; Summer Conference in the Recent Developments in Nonequilibrium Solvents for College Teachers of Undergraduate Chemistry; 14 days; $14,500

CARLETON COLLEGE, Northfield, Minn.; Robert A. Reit; Summer Conference in Solid State Physics for College Teachers of Physics; 13 days; $10,600

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Burton V. Dean; Summer Conference on New Applications of Mathematical Statistics in the Design and Operation of Complex Systems for College Teachers of Mathematics and Engineering; 19 days; $27,300

COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.; Donald W. Wood; Summer Conference in Genetics for College Teachers of Genetics; 19 days; $14,600

CORNELIUS, Mount Vernon, Iowa; Cecil F. Dan; Summer Conference in Radioisotopes and Their Uses for Junior College Teachers of Biology, Chemistry, and Physics; 12 days; $16,700

UNIVERSITY OF DETROIT, Detroit, Mich.; Fraw M. Reinhard; Summer Conference in Science and Methods for College Teachers of Engineering in Graphics, Mechanics, Physics and Mathematics; 12 days; $8,400

UNIVERSITY OF FLORIDA, Gainesville, Fla.; Paul Margolin; Summer Conference in the Recent Developments in Molecular and Developmental Genetics for College Teachers of Genetics; 20 days; $15,300

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, N. C.; Victor A. Greulach; Summer Conference in Botany, With Emphasis on Plant Evolution and Plant Evolution and Plant Biology for New College and College Teachers of General Biology and General Botany; 19 days; $13,800

UNIVERSITY OF OKLAHOMA, Norman, Okla.; William Vlaman; Summer Conference in Computer Programming and Related Mathematics for College Teachers of Science and Mathematics; 25 days; $29,700

Purdue University, Lafayette, Ind.; Warren S. Brandt; Summer Conference in Chromatography; Theory and Practice for College Teachers of Chemistry; 13 days; $15,100

SACRAMENTO STATE COLLEGE FOUNDATION, Sacramento, Calif.; George N. Beamariage; Summer Conference in Recent Developments in Mathematics and the Teaching of Arithmetic for College Teachers and Elementary School Supervisors of Arithmetic; 13 days; $21,700

TUTTLE COLLEGE, Medford, Mass.; M. Kent Wilson; Summer Conference in Recent Advances in Chemical Bonding for College Teachers of Chemistry; 11 days; $10,100

WASHINGTON UNIVERSITY, Saint Louis, Mo.; Gerald L. Esterson; Summer Conference in
SUMMER SCIENCE TRAINING PROGRAM FOR SECONDARY SCHOOL STUDENTS

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College Station, Tex.; Melvin C. Schroeder; 5 weeks; $12,490

John J. Sperry; 6 weeks; $4,703

AGRICULTURAL AND TECHNICAL COLLEGE OF NORTH CAROLINA, Greensboro, N.C.; B. T. White; 6 weeks; $22,110

University of Alaska, College, Alaska; William S. Wilson; 3 weeks; $11,040

AMERICAN ACADEMY OF ARTS AND SCIENCES, Boston, Mass.; Gordon O. Thayer, Thayer Academy; 10 weeks; $25,220

AMERICAN METEOROLOGICAL SOCIETY, Boston, Mass.; Vincent J. Schaefer; 7 weeks; $21,490

AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Franklin M. Branley; 4 weeks; $8,950

APPALACHIAN STATE TEACHERS COLLEGE, Boone, N.C.; P. E. Ray Derrick; 5 weeks; $13,830

Arizona State College, Flagstaff, Ariz.; J. Harvey Butchart; 5 weeks; $7,340

BROWNING GREEN STATE UNIVERSITY, Bowling Green, Ohio; W. H. Hall; 5 weeks; $4,760

Bucknell University, Lewisburg, Pa.; Lester Kieft; 6 weeks; $16,620

University of Buffalo, Buffalo, N.Y.; Robert Guthrie; 8 weeks; $12,570

BURLING PLANETARIUM AND INSTITUTE OF POPULAR SCIENCE, Pittsburgh, Pa.; Arthur L. Draper; 6 weeks; $3,500

Butler University, Indianapolis, Ind.; William H. Bessey; 7 weeks; $7,010

CALIFORNIA STATE POLYTECHNIC COLLEGE, San Luis Obispo, Calif.; William Thurmond; 4 weeks; $15,990

University of California, Berkeley, Calif.; Clifford Bell; Los Angeles; 6 weeks; $5,820

Norris W. Rakestraw, Scripps Institution of Oceanography, La Jolla; 10 weeks; $7,470

D. M. Reynolds; Davis; 6 weeks; $17,900

Robert A. Rice; 6 weeks; $19,130

University of Chicago, Chicago, Ill.; William H. Dyer; 6 weeks; $33,540

COMBATE UNIVERSITATI, Hamburg, N.Y.; Robert E. Todd; 6 weeks; $14,890

College of the Pacific, Stockton, Calif.; Jesse S. Binford, Jr.; 6 weeks; $4,810

Colorado College, Colorado Springs, Colo.; Richard G. Bedierman; 8 weeks; $9,320

COLORADO SCHOOL OF MINES, Golden, Colo.; John E. Re; 6 weeks; $17,920

COMMITTEE FOR ADVANCED SCIENCE TRAINING, INSTITUTE FOR MEDICAL RESEARCH, Cedars of Lebanon Hospital, Los Angeles, Calif.; Harry Sobel; 10 months; $6,700

Cooper Union for the Advancement of Science and Art, New York, N.Y.; Edward M. Griswold; 6 weeks; $28,900

Cornell University, Ithaca, N.Y.; Thomas R. Nielsen; 6 weeks; $36,010

University of Denver, Denver, Colo.; H. P. Leigly, Jr.; 9 weeks; $6,850

University of Detroit, Detroit, Mich.; Jon J. Kabara; 8 weeks; $250

East Texas State College, Commerce, Texas; 2 weeks; $6,100

Eastern Montana College of Education, Billings, Mont.; Oliver W. Peterson; 8 weeks; $2,380

Emory and Henry College, Emory, Va.; Marcus Blesi; 5 weeks; $8,900

Emory University, Atlanta, Ga.; J. G. Lester; 5 weeks; $2,775

Fisk University, Nashville, Tenn.; Samuel P. Massie; 6 weeks; $14,120

Florida State University, Tallahassee, Fla.; Dwight B. Goodner; 6 weeks; $9,220

University of Florida, Gainesville, Fla.; Lurther A. Arnold; 8 weeks; $14,630

Geneva College, Beaver Falls, Pa.; Roy M. Adams; 6 weeks; $6,120

Georgia Institute, Athens, Ga.; T. H. Whitehead; 6 weeks; $10,020

Goddard College, Plainfield, Vt.; George Beecher; 5 weeks; $8,540

University of Hawaii, Honolulu, Hawaii; Donald W. Mullin; 6 weeks; $15,470

Hiram College, Hiram, Ohio; Edward B. Ross; 5 weeks; $6,380

University of Houston, Houston, Tex.; John C. Allred; 6 weeks; $11,270

Indiana University, Bloomington, Ind.; Robert A. Rice; 6 weeks; $14,900

Howard University, Washington, D.C.; Herman Branson; 8 weeks; $15,270

Humboldt State College Foundation, Arcata, Calif.; John M. Burgeman; 4 weeks; $14,630

Hunter College, New York, N.Y.; Melvin S. Schwartz; 6 weeks; $6,390

Henry D. Thompson; 5 weeks; $5,880

Illinois Institute of Technology, Chicago, Ill.; Halm Retzlind; 34 weeks; $18,980

University of Illinois, Urbana, Ill.; J. S. Dobrovolsky; 6 weeks; $15,700

Indiana University, Bloomington, Ind.; Paul Klinge; 2 weeks; $27,220

University of Washington, University of Puerto Rico, San German, P.R.; Ismael Velea; 9 weeks; $15,620

Kansas State Teachers College, Emporia, Kan.; Otto M. Smith; 6 weeks; $14,750

University of Kansas, Lawrence, Kan.; Robert W. Baxter; 3 weeks; $17,240

Kennebec College, Kennebunk, N.H.; Alan N. Hall; 6 weeks; $26,030

Kenyon College, Gambier, Ohio; William R. Truesdell; 4 weeks; $12,050

Knox College, Galesburg, Ill.; Paul H. Shepard; 6 weeks; $17,290

Knoxville College, Knoxville, Tenn.; Joseph M. Reyes; 8 weeks; $35,880

Lehigh University, Bethlehem, Pa.; Albert Wilansky; 6 weeks; $5,010

Louisiana Polytechnic Institute, Ruston, La.; T. J. Larrow; 8 weeks; $19,060

Louisiana State University, Baton Rouge, La.; Herman H. Bentz; 12 weeks; $6,850

John F. Christian; 9 weeks; $19,040

 Loyola University of Los Angeles, Los Angeles, Calif.; Clarence J. Walen; 3 months; $3,040
RESEARCH PARTICIPATION FOR TEACHER TRAINING

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College Station, Tex.; J. B. Page; 5 months; $20,950
UNIVERSITY OF ARIZONA, Tucson, Ariz.; A. B. Weaver; 3 months; $23,150
BOTUS THOMPSON INSTITUTE FOR PLANT PHYSIOLOGY, Ithaca, N.Y.; Lawrence P. Miller; 3 months; $9,000
BRIGHAM YOUNG UNIVERSITY, Provo, Utah; K. LeRoi Nelson; 3 months; $13,925
BROOKLYN COLLEGE, Brooklyn, N.Y.; G. Moriber; 3 months; $4,800
UNIVERSITY OF BUFFALO, Buffalo, N.Y.; Howard G. Mallinson; 3 months; $8,900
COLORADO STATE COLLEGE, Fort Collins, Colo.; Clark E. Beard; 3 months; $18,690
COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.; 3 months; $19,265
UNIVERSITY OF COLORADO, Denver, Colo.; William C. Strickler; 3 months; $35,010
UNIVERSITY OF COLORADO, Boulder, Colo.; Bert M. Tolbert; 3 months; $24,345
CORNELL UNIVERSITY, Ithaca, N.Y.; Philip G. Johnson; 3 months; $35,900
UNIVERSITY OF DELAWARE, Newark, Del.; James C. Kakavss; 3 months; $18,655
DRAKE UNIVERSITY, Des Moines, Iowa; James P. Johnson; 3 months; $16,660
FLORIDA STATE UNIVERSITY, Tallahassee, Fla.; J. A. Chamberlin; 3 months; $8,445
FURMAN UNIVERSITY, Greenville, S.C.; J. A. Southern; 3 months; $15,985
UNIVERSITY OF GEORGIA, Athens, Ga.; Robert A. McRorie; 3 months; $23,000
GOSHEN COLLEGE, Goshen, Ind.; Henry D. Reinheimer; 3 months; $1,250
PENN STATE COLLEGE, Altoona, Pa.; W. Conrad Fernelius; 3 months; $9,880
UNIVERSITY OF GEORGIA, Athens, Ga.; Robert A. McRorie; 3 months; $23,000
GOSHEN COLLEGE, Goshen, Ind.; Henry D. Reinheimer; 3 months; $1,250
HIGH ALTITUDE OBSERVATORY OF THE UNIVERSITY OF COLORADO, Boulder, Colo.; Donald E. Billings; 3 months; $4,425
HIGHLANDS BIOLOGICAL STATION, Inc., Highlands, N.C.; Thelma Howell; 3 months; $5,095
HOWARD UNIVERSITY, Washington, D.C.; Lloyd N. Ferguson; 3 months; $21,605
ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, Ill.; Leslie H. Hedin; 3 months; $12,525
INDIANA UNIVERSITY, Bloomington, Ind.; Paul Klingle; 3 months; $24,400
INSTITUTE FOR PAPER CHEMISTRY, Appleton, Wis.; George D. Jernegen; 3 months; $8,050
INSTITUTE OF SCIENCE AND TECHNOLOGY, Ames, Iowa; Paul E. Romberg; 3 months; $28,650
KANSAS STATE TEACHERS COLLEGE, Emporia, Kans.; Ted F. Andrews; 3 months; $13,590
KANSAS UNIVERSITY, Lawrence, Kans.; C. A. VanderWert; 3 months; $11,125
KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; E. M. Spokes; 3 months; $3,660
KNOX COLLEGE, Galesburg, Ill.; Russell Sutton; 3 months; $6,420
LONG BEACH STATE COLLEGE FOUNDATION, Long Beach, Calif.; Darwin L. Mayfield; 3 months; $10,510
LOUISIANA STATE UNIVERSITY, Baton Rouge, La.; John F. Christman; 3 months; $9,010
UNIVERSITY OF MARYLAND, College Park, Md.; Howard Laster; 3 months; $7,280
UNIVERSITY OF MASSACHUSETTS, Amherst, Mass.; D. S. Van Fleet; 3 months; $5,855
MIAMI UNIVERSITY, Oxford, Ohio; Harry Weller; 3 months; $15,070
UNIVERSITY OF MISSOURI, Columbia, Mo.; Robert H. Meybury; 3 months; $10,030
MONTANA STATE UNIVERSITY, Missoula, Mont.; Louis G. Brown; 3 months; $4,555
NEWARK COLLEGE OF ENGINEERING RESEARCH FOUNDATION, Newark, N.J.; Robert A. Hagedorn; 3 months; $7,000
NEW MEXICO HIGHLANDS UNIVERSITY, Las Vegas, N. Mex.; E. Gerald Meyer; 3 months; $19,665
UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Philip E. Bocouet; 3 months; $19,435
NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N.C.; Homer C. Folks; 3 months; $26,940
OHIO STATE UNIVERSITY, Columbus, Ohio; J. A. Callenbach; 3 months; $23,650
UNIVERSITY OF NORTH DAKOTA, Grand Forks, N. Dak.; Francis A. Jacobs; 3 months; $16,100
UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Milton Burton; 3 months; $11,060
NORTH TEXAS STATE COLLEGE, Denton, Tex.; Robert C. Sherman; 3 months; $16,060
OHIO STATE UNIVERSITY, Columbus, Ohio; E. D. Deatherage; 3 months; $5,700
OKLAHOMA STATE UNIVERSITY, Stillwater, Okla.; Robert MacVicer; 3 months; $18,410
UNIVERSITY OF OREGON, Eugene, Okla.; Horace Bliss, Oklahoma Science Service; 3 months; $17,355
CARL D. HIGGLES, Biological Station, Willits; 3 months; $16,480
OREGON STATE COLLEGE, Corvallis, Ore.; A. T. Longest; 3 months; $8,415
PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; W. Conrad Fernellius; 3 months; $20,085
UNIVERSITY OF REDLANDS, Redlands, Calif.; Robert H. Maybury; 3 months; $10,080
RENSSELAER POLYTECHNIC INSTITUTE, Troy, N.Y.; R. L. Strong; 3 months; $17,110
RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK, Albany, N.Y.; Edwin C. John, Syracuse; 3 months; $11,125
UNIVERSITY OF RHODE ISLAND, Kingston, R.I.; Eugene C. Winslow; 3 months; $6,190
UNIVERSITY OF ROCHESTER, Rochester, N.Y.; 2 months; $23,060
ROSWELL PARK MEMORIAL INSTITUTE, Buffalo, N.Y.; Edwin A. Mirand; 3 months; $14,950
ST. JOHN'S UNIVERSITY, Jamaica, N.Y.; Paul T. Medici; 3 months; $15,130
UNIVERSITY OF SOUTH CAROLINA, Columbia, S.C.; Peyton C. Teague; 8 months; $20,246
UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, Calif.; Edgar Warnock; 3 months; $17,425
STANFORD UNIVERSITY, Stanford, Calif.; O. Cutler Shepard; 3 months; $10,965
STATE UNIVERSITY OF IOWA, Iowa City, Iowa; Ralph L. Shriver; 8 months; $18,745
STATE UNIVERSITY OF SOUTH DAKOTA, Vermillion, S.Dak.; George P. Scott; 8 months; $16,590
STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N.J.; 3 months; $9,040
TULANE UNIVERSITY, New Orleans, La.; 8 months; $14,710
UNIVERSITY OF TENNESSEE, Knoxville, Tenn.; $10,130
UNIVERSITY OF TEXAS, Austin, Tex.; Addison E. Lee; 3 months; $17,015
UNIVERSITY OF VIRGINIA, Charlottesville, Va.; Stephan Berko; 3 months; $9,645
JACQUES J. RAPPAPORT; 3 months; $6,040
Bart Van't Riet; 3 months; $11,135
Waines State University, Detroit, Mich.; Karl H. Gayer; 3 months; $13,730
WESTERN STATE COLLEGE, Gunnison, Colo.; C. G. Warren; 3 months; $1,370
UNIVERSITY OF WISCONSIN, Madison, Wis.; Donald H. Bucklin; 1 year; $48,835
YALE UNIVERSITY, New Haven, Conn.; Harlan J. Smith; 3 months; $1,370

UNDERGRADUATE RESEARCH PARTICIPATION PROGRAM

ADIELPHI COLLEGE, Long Island, N.Y.; 9 months; $4,860
AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College Station, Tex.; 1 year; $3,490
2 years; $3,545
AGRICULTURAL AND TECHNICAL COLLEGE OF NORTH CAROLINA, Greensboro, N.C.; 1 year; $4,220
1 year; $5,175
ALFRED COLLEGE, Alfred, N.Y.; 3 months; $5,485
ALLEGHENY COLLEGE, Meadville, Pa.; 1 year; $5,935
AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; 1 year; $22,925
AMERICAN UNIVERSITY, Washington, D.C.; 3 months; $3,740
AMHERST COLLEGE, Amherst, Mass.; 3 months; $4,950
ARIZONA STATE UNIVERSITY, Tempe, Ariz.; 1 year; $2,655

UNIVERSITY OF ARIZONA, Tucson, Ariz.; 1 year; $10,550
UNIVERSITY OF ARKANSAS, Fayetteville, Ark.; 1 year; $13,995
ARIZONAL STATE COLLEGE, Arlington, Tex.; 9 months; $575
ASBURY UNIVERSITY, Wilmore, Ky.; 1 year; $5,220
ASBURY UNIVERSITY, Auburn, Ala.; 1 year; $9,980
BARNARD COLLEGE, New York, N.Y.; 2 years; $8,840
BOSTON COLLEGE, Chestnut Hill, Mass.; 1 year; $5,880
BOSTON UNIVERSITY, Boston, Mass.; 1 year; $7,175
1 year; $7,590
BOWDOIN COLLEGE, Brunswick, Maine; 2 years; $5,010
3 months; $920
BRANDEIS UNIVERSITY, Waltham, Mass.; 1 year; $4,830
2 years; $8,690
1 year; $6,670
2 years; $7,850
BRIDGEND COLLEGE, Bridgewater, Va.; 2 years; $4,140
BROWN UNIVERSITY, Providence, R.I.; 1 year; $9,880
12 months; $10,280
BRYN MAWR COLLEGE, Bryn Mawr, Pa.; 3 months; $4,140
2 years; $9,640
3 months; $4,865
BUCKNELL UNIVERSITY, Lewisburg, Pa.; 3 months; $7,920
9 months; $715
9 months; $715
UNIVERSITY OF BUFFALO, Buffalo, N.Y.; 3 months; $1,960
BUTLER UNIVERSITY, Indianapolis, Ind.; 9 months; $2,590
CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; 3 months; $7,130
2 years; $8,220
2 years; $10,350
2 years; $10,350
UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; 3 months; $4,565
2 months; $18,820
1 year; $8,740
1 year; $8,840
1 year; $9,235
1 year; $23,665
2 years; $9,600
CATHOLIC UNIVERSITY OF AMERICA, Washington, D.C.; 1 year; $5,950
CASTLETON COLLEGE, Northfield, Minn.; 3 months; $1,880
CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa.; 3 months; $4,830
3 months; $7,800
3 months; $2,690
1 year; $8,380
1 year; $5,890
1 year; $7,350
CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; 3 months; $5,870
CATHOLIC UNIVERSITY OF AMERICA, Washington, D.C.; 1 year; $4,815
3 months; $8,120
University of Chicago, Chicago, Ill.; 8 months; $18,210
3 months; $5,615

University of Cincinnati, Cincinnati, Ohio; 1 year; $3,450

City College of the City of New York, New York, N.Y.; 9 months; $9,810
3 months; $11,040

Clarkson College of Technology, Potsdam, N.Y.; 1 year; $5,750

Colby College, Waterville, Maine; 8 months; $6,365
3 months; $495

College of Arts and Sciences, University, Hamilton, N.Y.; 1 year; $8,715

College of Charleston, Charleston, S.C.; 1 year; $9,730

College of Notre Dame of Maryland, Baltimore, Md.; 9 months; $4,255

Colorado College, Colorado Springs, Colo.; 1 year; $3,315

Colorado College, Colorado Springs, Colo.; 8 months; $1,060

Colorado College, Colorado Springs, Colo.; 8 months; $1,060

Colorado State University, Fort Collins, Colo.; 8 months; $5,610
1 year; $8,795
1 year; $6,230

University of Colorado, Boulder, Colo.; 8 months; $12,215
3 months; $12,215
1 year; $6,025
3 months; $2,530
2 years; $7,385

University of Connecticut, Storrs, Conn.; 1 year; $2,700

Cooper Union for the Advancement of Science, New York, N.Y.; 1 year; $6,025

Cornell College, Mount Vernon, Iowa; 1 year; $5,570
2 years; $4,140

Cornell University, Ithaca, N.Y.; 2 months; $1,035

Creedmoor Institute for Psychobiologic Studies, Jamaica, N.Y.; 2 years; $4,495

Dartmouth College, Hanover, N.H.; 9 months; $175
1 year; $6,170
2 years; $3,880
2 years; $4,320
2 years; $8,150
2 years; $11,350

University of Denver, Denver, Colo.; 1 year; $4,770

University of Detroit, Detroit, Mich.; 1 year; $7,940

Dickinson College, Carlisle, Pa.; 1 year; $6,305

Lilliam University, New Orleans, La.; 1 year; $5,575

Drexel Institute of Technology, Philadelphia, Pa.; 3 months; $2,450
3 months; $5,555

Duke University, Durham, N.C.; 2 years; $10,005

Duquesne University, Pittsburgh, Pa.; 2 years; $10,320

Earlham College, Richmond, Ind.; 3 months; $8,880

Eastern Nazarene College, Wollaston, Mass.; 2 years; $10,400

Evansville College, Evansville, Ind.; 2 years; $4,855

Fairfield University, Fairfield, Conn.; 2 years; $7,300

Florida A&M University, Tallahassee, Fla.; 1 year; $4,750

Florida State University, Tallahassee, Fla.; 1 year; $12,880

Fordham University, New York, N.Y.; 1 year; $14,490

Franklin and Marshall College, Lancaster, Pa.; 3 months; $8,050
2 years; $9,100

Furman University, Greenville, S.C.; 1 year; $7,480

George Washington Carver Foundation of the Tuskegee Institute, Tuskegee, Ala.; 1 year; $15,000

Georgia Institute of Technology, Atlanta, Ga.; 2 years; $11,730

University of Georgia, Athens, Ga.; 1 year; $5,355
2 years; $6,440

Grinnell College, Grinnell, Iowa; 3 months; $4,745

Hamline University, St. Paul, Minn.; 9 months; $1,495

Hamilton College, Clinton, N.Y.; 3 months; $11,420

Hamden-Sydney College, Hampden-Sydney, Va.; 3 months; $1,000

Harvard University, Cambridge, Mass.; 3 months; $11,250

Haverford College, Haverford, Pa.; 2 years; $4,620
3 months; $760

University of Hawaii, Honolulu, Hawaii; 1 year; $4,095
2 months; $4,445

Hollins College, Hollins College, Va.; 9 months; $5,000

Howard University, Washington, D.C.; 9 months; $5,425

Humboldt State College, Arcata, Calif.; 1 year; $5,170

Illinois Institute of Technology, Chicago, Ill.; 2 months; $6,810
1 year; $5,520
9 months; $1,700
1 year; $9,640

University of Illinois, Urbana, Ill.; 3 months; $8,045
9 months; $6,605
1 year; $8,970
2 years; $7,275

Immaculate Heart College, Los Angeles, Calif.; 1 year; $10,810

Iowa State University of Science and Technology, Ames, Iowa; 1 year; $9,690
1 year; $10,205

John Carroll University, Cleveland, Ohio; 1 year; $2,725

Johns Hopkins University, Baltimore, Md.; 1 year; $4,195
1 year; $5,420

Juniata College, Huntingdon, Pa.; 1 year; $5,900

Kansas State College of Pittsburg, Pittsburg, Kan.; 3 months; $2,725
9 months; $2,210
1 year; $5,080

Kansas State Teachers College, Emporia, Kan.; 1 year; $5,900

Kansas State University of Agriculture and Applied Science, Manhattan, Kan.; 3 months; $2,690
3 months; $6,820

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9 months: $770
1 year: $4,580
1 year: $4,256
1 year: $5,750
1 year: $9,130
1 year: $9,720
3 years: $8,505

University of Kansas, Lawrence, Kan.; 1 year: $22,880
Kentucky Research Foundation, Lexington, Ky.; 1 year: $33,015

1 year: $1,925
Kansas State College, Gambler, Ohio; 9 months: $700
1 year: $850
Knox College, Galesburg, Ill.; 2 years: $7,265

Lafayette College, Easton, Pa.; 3 months: $675
2 years: $7,375
Lamar State College of Technology, Bertram, Tex.; 3 months: $6,930

La Verne College, La Verne, Calif.; 2 years: $7,530
Lebanon Valley College, Annville, Pa.; 9 months: $4,140
Lehigh University, Bethlehem, Pa.; 3 months: $4,400
1 year: $4,400
1 year: $11,220
Linfield Research Institute, McMinnville, Ore.; 2 years: $5,775
Long Island Biological Association, Cold Spring Harbor, N.Y.; 3 months: $6,665
Louisiana Polytechnic Institute, Ruston, La.; 9 months: $535
Manhattan College, New York, N.Y.; 9 months: $1,210
9 months: $1,840
2 years: $5,540
University of Maryland, College Park, Md.; 3 months: $8,170

University of Miami, Coral Gables, Fla.; 2 years: $7,535
Michigan College of Mining and Technology, Houghton, Mich.; 3 months: $750
3 months: $3,400
9 months: $900
1 year: $8,800
Michigan State University of Agriculture and Applied Science, East Lansing, Mich.; 1 year: $5,295
9 months: $1,840
1 year: $16,270
1 year: $12,850
1 year: $9,495
1 year: $4,875
University of Michigan, Ann Arbor, Mich.; 1 year: $8,085
3 months: $1,025
University of Minnesota, Minneapolis, Minn.; 3 months: $4,090
3 months: $9,240
1 year: $11,650
1 year: $12,125
Minnesota State University, State College, Minn.; 9 months: $1,840
9 months: $2,485
3 months: $3,105

2 months: $4,025
3 months: $4,220
University of Missouri, Columbia, Mo.; 9 months: $2,115
9 months: $5,500
Montana State University, Missoula, Mont.; 2 years: $3,015
2 years: $4,865
Morehouse College, Atlanta, Ga.; 2 years: $6,015
Mount Holyoke College, South Hadley, Mass.; 3 months: $4,780
Muhlenberg College, Allentown, Pa.; 2 years: $5,635
University of Nebraska, Lincoln, Neb.; 1 year: $4,385
2 years: $9,860
Newark College of Engineering Research Foundation, Newark, N.J.; 9 months: $2,015
New Jersey Neuro-Psychiatric Institute, Princeton, N.J.; 1 year: $2,130; 1 year: $3,945
New Mexico Institute of Mining and Technology, Socorro, N. Mex.; 3 months: $6,720
New Mexico State University, University Park, N. Mex.; 1 year: $23,380
New York University, New York, N.Y.; 9 months: $3,050
8 months: $5,510
North Carolina State College of Agriculture and Engineering, Raleigh, N.C.; 9 months: $5,395
9 months: $3,225
1 year: $5,340
1 year: $4,545
1 year: $7,075
University of North Carolina, Chapel Hill, N.C.; 3 months: $3,315
2 months: $5,540
3 months: $6,210
8 months: $8,625
1 year: $5,005
2 years: $8,945
North Dakota Agricultural College, Fargo, N. Dak.; 1 year: $15,675
1 year: $5,275
1 year: $4,210
University of North Dakota, Grand Forks, N. Dak.; 3 months: $570
3 months: $5,100
3 months: $5,245
9 months: $750
9 months: $885
9 months: $1,150
2 years: $3,600
2 years: $6,725
2 years: $8,715
9 months: $730
Northwestern University, Boston, Mass.; 9 months: $4,500
Northern Illinois University, De Kalb, Ill.; 3 months: $2,990
Northwest Nazarene College, Nampa, Idaho; 1 year: $3,720
Northwestern State College of Louisiana, Natchitoches, La.; 9 months: $755
Northwestern University, Evanston, Ill.; 3 months: $14,730
3 months: $4,140
1 year: $9,395
University of Notre Dame, Notre Dame, Ind.; 9 months: $1,070
3 months: $955
Oberlin College, Oberlin, Ohio; 3 months: $4,485
<table>
<thead>
<tr>
<th>Institution Name</th>
<th>Location</th>
<th>Tuition (1 year)</th>
<th>Tuition (9 months)</th>
<th>Tuition (3 months)</th>
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<td><strong>Ohio University, Athens, Ohio</strong></td>
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<td><strong>Rice Institute, Houston, Tex.; 1 year:</strong></td>
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<td><strong>Rollins College, Winter Park, Fl.; 1 year:</strong></td>
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<td><strong>Robeson E. Jackson Memorial Laboratory, Bar Harbor, Maine; 3 months:</strong></td>
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<td><strong>Rosemont College, Rosemont, Pa.; 3 months:</strong></td>
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<td><strong>RUTGERS, THE STATE UNIVERSITY, New Brunswick, N.J.; 9 months:</strong></td>
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<td><strong>St. Louis University, St. Louis, Mo.; 3 months:</strong></td>
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<td><strong>9 months:</strong>                      <strong>$1,655</strong></td>
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<td><strong>9 months:</strong>                      <strong>$2,070</strong></td>
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<td><strong>2 years:</strong>                       <strong>$4,005</strong></td>
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<td><strong>3 years:</strong>                       <strong>$6,550</strong></td>
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<td><strong>Saint Mary's College, Winona, Minn.; 1 year:</strong></td>
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<td><strong>San Diego State College Foundation, San Diego, Calif.; 1 year:</strong></td>
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<td><strong>University of Scranton, Scranton, Pa.; 3 months:</strong></td>
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<td><strong>University of Tennessee Agricultural and Industrial State University, Nashville, Tenn.; 9 months:</strong></td>
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<td><strong>University of Tennessee Polytechnic Institute, Cookeville, Tenn.; 9 months:</strong></td>
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235
<table>
<thead>
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<th>University Name</th>
<th>Location</th>
<th>Program Duration</th>
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<td>University of Tennessee, Knoxville, Tenn.</td>
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<td>Texas Christian University, Fort Worth, Tex.</td>
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<td>Texas Lutheran College, Seguin, Tex.</td>
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<tr>
<td>Texas Woman's University, Denton, Tex.</td>
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<td>University of Texas, Austin, Tex.</td>
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<td>University of Louisiana, New Orleans, La.</td>
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MILLSOPH COLLEGE, Jackson, Miss.; 2 years: $3,065
MISSISSIPPI STATE UNIVERSITY, State College, Miss.; 9 months: $2,215
3 months: $435
MOORE MOUNT COLLEGE, Milwaukee, Wis.; 9 months: $500
NEWARK COLLEGE OF ENGINEERING, Newark, N.J.; 3 months: $2,755
NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING, Raleigh, N.C.; 1 year: $4,445
UNIVERSITY OF NORTH DAKOTA, Grand Forks, N.Dak.; 9 months: $1,405
NOTRE DAME COLLEGE, Cleveland, Ohio; 2 years: $7,885
OCLOCAL COLLEGE, Los Angeles, Calif.; 2 years: $8,690
OHIO WESLEYAN UNIVERSITY, Delaware, Ohio; 1 year: $3,225
2 years: $6,870
OREGON STATE COLLEGE, Corvallis, Oreg.; 3 months: $4,250
9 months: $770
9 months: $700
9 months: $975
PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; 3 months: $805
UNIVERSITY OF PUERTO RICO, Rio Piedras, P.R.; 2 years: $7,710
REED COLLEGE, Portland, Oreg.; 1 year: $5,405
RUTGERS, THE STATE UNIVERSITY, New Brunswick, N.J.; 1 year: $3,855
ST. JOHN'S UNIVERSITY, Collegeville, Minn.; 1 year: $2,900
ST. JOSEPH'S UNIVERSITY, Emmitsburg, Md.; 1 year: $2,240
ST. JOSEPH'S COLLEGE FOR WOMEN, Brooklyn, N.Y.; 1 year: $3,070
ST. MARY'S COLLEGE, Notre Dame, Ind.; 1 year: $2,240
SAN DIEGO STATE COLLEGE FOUNDATION, San Diego, Calif.; 1 year: $9,920
1 year: $8,395
SKIDMOR COLLEGE, Saratoga Springs, N.Y.; 2 years: $3,000
SMITH COLLEGE, Northampton, Mass.; 2 years: $8,825
SOUTHEAST MISSOURI STATE COLLEGE, Cape Girardeau, Mo.; 1 year: $8,715
SOUTHWESTERN AT MEMPHIS, Memphis, Tenn.; 2 years: $5,205
1 year: $7,820
STETSON UNIVERSITY, De Land, Fla.; 9 months: $2,015
UNIVERSITY OF TAMPA, Tampa, Fla.; 3 months: $1,755
TEXAS WOMAN'S UNIVERSITY, Denton, Tex.; 2 years: $13,385
UNIVERSITY OF TOLEDO, Toledo, Ohio; 1 year: $14,580
VASSAR COLLEGE, Poughkeepsie, N.Y.; 1 year: $4,260
VILLANOVA UNIVERSITY, Villanova, Pa.; 1 year: $2,990
9 months: $1,300
VIRGINIA STATE COLLEGE, Petersburg, Va.; 1 year: $6,130
WASHINGTON STATE UNIVERSITY, Pullman, Wash.; 9 months: $920
WAYNE STATE UNIVERSITY, Detroit, Mich.; 3 months: $4,480
WESTERN UNIVERSITY, Middletown, Conn.; 3 months: $1,835
WEST VIRGINIA WELSHWELL COLLEGE, Buckhannon, W. Va.; 2 years: $5,340
WILKES COLLEGE, Wilkes-Barre, Pa.; 1 year: $5,045
UNIVERSITY OF WISCONSIN, Madison, Wis.; 1 year: $9,205
WOFFORD COLLEGE, Spartanburg, S.C.; 9 months: $550
XAVIER UNIVERSITY, Cincinnati, Ohio; 3 months: $1,840
YALE UNIVERSITY, New Haven, Conn.; 1 year: $3,380
1 year: $5,985

VISITING SCIENTIST PROGRAM

AMERICAN ANTHROPOLOGICAL ASSOCIATION, Washington, D.C.; Leslie A. White; Program of Visiting Lecturers in Anthropology; 1 year: $21,870
AMERICAN CHEMICAL SOCIETY, Washington, D.C.; Donald J. Cook; Program of Visiting Scientists in Chemistry; 1 year: $10,900
Donald J. Cook; Visiting Scientists Program to Secondary Schools; 1 year: $17,500
AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D.C.; Hiden T. Cox; Program of Visiting Lecturers in Biology to High Schools; 1 year: $7,475
Hiden T. Cox; Program of Visiting Scientists to Secondary Schools; June 15-30, 1961; $76,070
Hiden T. Cox; Program of Visiting Lecturers in Biology to High Schools; 1 year: $26,680
AMERICAN INSTITUTE OF PHYSICS, New York, N.Y.; Elmer Hutchison; Program of Visiting Scientists in Physics to High Schools; 1 year: $29,750
AMERICAN PSYCHOLOGICAL ASSOCIATION, Washington, D.C.; John G. Darley; Program of Visiting Scientists in Psychology; 1 year: $25,000
ARKANSAS ACADEMY OF SCIENCE, ARKANSAS STATE TEACHERS COLLEGE, Conway, Ark.; John W. Keese; Visiting Scientists Program for the High Schools in Arkansas; 1 year: $10,750
COLORADO-WYOMING ACADEMY OF SCIENCE, UNIVERSITY OF WYOMING, Laramie, Wyoming; Richard G. Deidlemann; Colorado-Wyoming Visiting Science Lectureship Program; 1 year: $3,480
INDIANA ACADEMY OF SCIENCE, PURDUE UNIVERSITY, Lafayette, Ind.; Howard M. Michaud; Visiting Scientists Program for High Schools; 1 year: $1,150
MARYLAND ACADEMY OF SCIENCES, Baltimore, Md.; Thomson King; Visiting Scientists Program; 1 year: $1,220
MINNESOTA ACADEMY OF SCIENCE, ST. OLAF COLLEGE, Northfield, Minn.; Harold W. Hansen; Visiting Scientists Program and Science Teachers Institute; 1 year: $22,700
MONTANA ACADEMY OF SCIENCES, MONTANA STATE COLLEGE, Bozeman, Mont.; E. W. Anacker; Visiting Scientists Program for High Schools; 1 year: $12,280
NEBRASKA ACADEMY OF SCIENCES, INC., CONCORDIA COLLEGE, Seward, Nebr.; James A. Rutledge; Visiting Scientists Program; 1 year: $15,500
NEW MEXICO ACADEMY OF SCIENCE, NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, Socorro, N. Mex.; Burrell L. Wood; Visiting Scientist Program for the High Schools in New Mexico; 2 years: $3,110
OHIO ACADEMY OF SCIENCES, Columbus, Ohio; Kenneth B. Hobbs; Visiting Scientists Program for the Public and Private Schools of Ohio; 1 year: $21,970
SOCIETY OF AMERICAN FORESTRERS, Washington, D.C.; Henry Clepper; A Visiting Scientist Program; 1 year; $15,730

SOCIETY OF WOOD SCIENCE AND TECHNOLOGY, UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Frank R. Dickinson, University of California; Program of Visiting Scientists in Wood Science and Technology; 3 years; $13,720

TEXAS ACADEMY OF SCIENCE, TEXAS INSTITUTES, INC., Dallas, Tex.; Addison E. Lee; Texas Academy of Science Visiting Scientists Program; 1 year; $26,300

UTAH ACADEMY OF SCIENCE, ARTS AND LETTERS, UNIVERSITY OF UTAH, Salt Lake City, Utah; Orson A. Young; Visiting Scientist Program for the High Schools in Utah; 1 year; $7,570

VIRGINIA ACADEMY OF SCIENCE, WASHINGTON AND LEE UNIVERSITY, LEESBURG, Va.; John C. Forbes; Visiting Scientists Program; 1 year; $4,390

WEST VIRGINIA ACADEMY OF SCIENCE, FAIRMONT STATE COLLEGE, Fairmont, W. Va.; John C. Wright, West Virginia Wesleyan College; Visiting Scientists Program for West Virginia High Schools; 1 year; $5,680

VISITING FOREIGN SCIENTIST PROGRAM

AMERICAN ASTRONOMICAL SOCIETY, New York, N.Y.; Joseph M. Chamberlain; 1 year; $25,875

Joseph M. Chamberlain; 2 years; $56,090

AMERICAN CHEMICAL SOCIETY, Washington, D.C.; Samuel P. Massie; 7 months; $25,000

Donald J. Cook; June 30, 1961; $33,000

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D.C.; Elton H. Cox; 1 year; $50,300

AMERICAN INSTITUTE OF PHYSICS, New York, N.Y.; E. C. Spengler; 1 year; $27,270

AMERICAN MATHEMATICAL SOCIETY, Providence, R.I.; Gordon L. Walker; 1 year; $25,000

Kenneth C. Spengler; 1 year; $46,800

ENGINEERS JOINT COUNCIL, New York, N.Y.; Joseph Wischelt, Jr.; 7 months; $25,000

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D.C.; Robert C. Stephenson; American Geological Institute; 2 years; $57,000

COURSE CONTENT IMPROVEMENT

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Washington, D.C.; John R. Mayor; Study of the Feasibility of a Major Effort to Improve Science Courses in Elementary and Junior High School Grades; 1 year; $98,700

AMERICAN ASSOCIATION OF PHYSICS TEACHERS, DARTMOUTH COLLEGE, Hanover, N.H.; F. W. Sears; Conference in Three Meetings to Develop a National Program for the Improvement of College Physics Courses; 6 months; $90,000

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, Washington, D.C.; H. Bentley Glass; Continuation of the Secondary Program of the Biological Sciences Curriculum Study; 1 year; $1,380,000

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, New York, N.Y.; F. J. Van Antwerpen; Study of Curricula in Chemical Engineering; 16 months; $28,150

AMERICAN INSTITUTE OF PHYSICS, New York, N.Y.; Elinor Hutchison; Apparatus Drawings Project; 1 year; $31,280

AMERICAN METEOROLOGICAL SOCIETY, BOSTON, MASS.; K. C. Spengler; Development of Educational Materials and Laboratory Slides in Meteorology; 1 year; $59,700

Kenneth C. Spengler; Development of a Monograph Series in Meteorology; 1 year; $14,190

LEICESTER UNIVERSITY, LEICESTER, Eng.; Bennett R. Willeford, Jr.; Conference on the Undergraduate Training of Chemistry Majors; 1 week; $14,190

UNIVERSITY OF CALIFORNIA, BERKELEY, Calif.; Robert Karplus, and Leo Brewer; Continuation of a Study of Course Content Improvement in Elementary School Science; 1 year; $31,750

A. L. Kroebel and S. A. Barrett; Documentary Sound Color Films and Sound Systems and for Students Training in This Specialized Work; 1 year; $76,000

David G. Mandelbaum; Conference on Educational Resources in Anthropology; during the spring of 1961; $13,730

Donald J. Cook; Development of Production of Short Motion Picture Films for University Level Instruction in Microbiology; 1 year; $33,650

Glenn T. Seaborg; Organization of a Chemical Education Materials Study; 7 months; $125,000

Kenneth C. Spengler; Preliminary Conference of the Steering Committee of the Proposed Chemical Education Materials Study (CHEMS); 3 days; $9,775

Glenn T. Seaborg; Organization of a Chemical Education Materials Study; 1 year; $475,000

E. G. Sherburne; Production of Eight Thirty-Minute Films on the Nature of Viruses; 1 year; $100,900

CASE INSTITUTE OF TECHNOLOGY, CLEVELAND, OHIO; James R. Hooper, Jr.; Workshop on Materials in Electrical Engineering Education; 5 days; $3,300

UNIVERSITY OF CONNECTICUT, STOITS, CONN.; J. T. Stock; Development of Apparatus for Chemical Analysis and Preparations on the Micro- and Semi-micro-Scale; 5 years; $13,460

COOPER UNION FOR THE ADVANCEMENT OF SCIENCE AND ART, New York, N.Y.; F. A. Wallace; A Study of the Scope and Content of Undergraduate Curricula in Civil Engineering; 1 year; $43,410

DARTMOUTH COLLEGE, HANOVER, N.H.; John W. Dewdney; Development of a Basic Mass Spectrometer; 1 year; $8,500

UNIVERSITY OF DAYTON, DAYTON, OHIO; RAYMOND J. STITH; Development of Inexpensive, Transparent, Flexible Models for Observation and Demonstration of Internal Deformation Patterns, for Courses in Mechanics of Materials; 1 year; $4,170

DUKE UNIVERSITY, DURHAM, N.C.; F. W. Woods; Laboratory Exercises for the Study of Stratification in Forest Microclimates; 1 year; $5,630

EARLEHAM COLLEGE, RICHMOND, IND.; Laurence E. Strong; An Introductory Chemistry Textbook Based on the Chemical Bond Approach; 8 months; $443,500

EDUCATIONAL SERVICES INCORPORATED, WATERTOWN, MASS.; JERROLD B. ZACHARIAS; Extension of FS30 Films to 45 Minutes for TV and Classroom Use; 1 year; $50,000
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<th>Institution</th>
<th>Project Description</th>
<th>Duration</th>
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<tr>
<td>Norwegian Highlands Institute</td>
<td>Development of Eepertmont on Momentum hr Znfroduc-</td>
<td>1 year</td>
<td>$350,000</td>
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<tr>
<td>University of Washington, Washington, D.C.</td>
<td>Raymond R. Bunker: Development of a Vortex Tunnel; Visual Pipe Network, Dynamic Model and Portable Vibration Simulator as Civil Engineering Teaching Aids; 10 months</td>
<td>$1,960</td>
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<tr>
<td>Harvard University, Cambridge, Mass.</td>
<td>J. H. Atkin and Stanley F. Wyatt; Education of Engineers and Scientists for Experiments on Momentum; 1 year</td>
<td>$4,210</td>
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<td>Johns Hopkins University, Baltimore, Md.</td>
<td>Lloyd M. Bates; Development of a Model Image Circuit; 1 year</td>
<td>$4,680</td>
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<td>Lehigh University, Bethlehem, Pa.</td>
<td>J. F. Dutton; Development of Educational Aids in Mechanical Engineering; 2 years</td>
<td>$21,670</td>
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<td>Massachusetts Institute of Technology, Cambridge, Mass.</td>
<td>Rolf Elissau; Study of the Improvement of Laboratory Curricula for Elementary Engineers; 2 days</td>
<td>$15,000</td>
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<td>Kurt S. Lin; Development Program for a Laboratory Course in Instrumentation; 1 year</td>
<td>$2,500</td>
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<td>Mathematical Association of America, University of Washington, Seattle, Wash.</td>
<td>R. C. Buck; Committee on the Undergraduate Program in Mathematics; 2 years</td>
<td>$350,000</td>
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<td>Michigan State University, East Lansing, Mich.</td>
<td>J. F. Dutton; Development of Large-Scale Lecture-Table Thermometer and Voltmeter; 1 year</td>
<td>$5,000</td>
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<td>Minnesota Academy of Science, St. Paul, Minn.</td>
<td>F. W. Went; Development of a Simple Classroom Plant Growth Chamber; 1 year</td>
<td>$8,400</td>
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<td>University of Minnesota, Minneapolis, Minn.</td>
<td>Lorenz G. Staub; Production of Instructional Motion Pictures in Flud Mechanics; 1 year</td>
<td>$15,950</td>
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<td>Missouri Botanical Garden, St. Louis, Mo.</td>
<td>Frank B. Allen; Development of a Supplementary Textbook on General Chemistry for Nonscience Majors; 1 week; $1,580</td>
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<tr>
<td>National Council of Teachers of Mathematics, Washington, D.C.</td>
<td>F. W. Went; Development of a Simple Classroom Plant Growth Chamber; 1 year</td>
<td>$8,400</td>
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<tr>
<td>New Mexico Highlands University, Las Vegas, N. Mex.</td>
<td>G. W. Ewing; Development of Equipment for College and University Courses in Instrumental Methods in Chemical Analysis, Physical Chemistry and Related Fields; 2 years</td>
<td>$20,320</td>
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<td>New York University, New York, N.Y.</td>
<td>I. L. Auerbach; Development of a Transparent Lamp System for Teaching Alternating Current Circuits in High School and College Physics; 1 year</td>
<td>$5,860</td>
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<td>North Carolina State College, Raleigh, N.C.</td>
<td>John F. Lee; Development of a Multipurpose Instrument for Quantitative Analysis and Quantitative Chemical Measurements; 3 years</td>
<td>$35,780</td>
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<td>North Dakota State University, Grand Forks, N. Dak.</td>
<td>F. D. Taber; Development of a Mechanical Model of the Binaural Adher; 7 months</td>
<td>$2,590</td>
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<td>Oregon College of Education, Monmouth, Oreg.</td>
<td>Allen L. Fulmer; Development of Inexpensive Digital Computers and Logarithmic Building Blocks; 2 years</td>
<td>$18,160</td>
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<td>Oregon State University, University Park, Pa.</td>
<td>John A. Fox; Design and Construction of a Small Laboratory and Demonstration Hyperbolic Wind Tunnel; 1 year</td>
<td>$12,520</td>
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<td>Polytechnic Institute of Brooklyn, Brooklyn, N.Y.</td>
<td>Paul R. DeCicco; Design and Construction of a Portable Heterochronous Analog Simulator-Computer Demonstrator; 14 months</td>
<td>$13,050</td>
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<td>Queens College, Flushing, N.Y.</td>
<td>Morris B. Abramson; Development of Apparatus and an Instructional Manual for Classroom Demonstration and Laboratory Experiments in Simple Harmonic Motion, Vibration of the Spring, Formation of Stave Waves, A.C. Voltages and Propagation of Waves; 1 year</td>
<td>$7,560</td>
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<td>Reed College, Portland, Oreg.</td>
<td>F. D. Todd; Development of Equipment and Experiments for Teaching Instrumental Chemical Analysis; 1 year</td>
<td>$6,080</td>
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OTHER EDUCATION IN THE SCIENCES GRANTS

ACADEMY OF SCIENCE OF ST. LOUIS, ST. LOUIS, MO.; MURL DUNING; SCIENCE CAREERS PROGRAM; 1 YEAR; $17,850

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, COLLEGE STATION, TEX.; E. B. MIDDLETON; SECONDARY SCHOOL SCIENCE TEACHER TRAINING PROGRAM FOR RETIRED MILITARY PERSONNEL; 1 YEAR; $22,435

K. M. RAE; SUPPLEMENTARY TRAINING FOR TEACHERS; 4 WEEKS; $27,185

MELVIN C. SCHROEDER; FOUR-WEEK COLLEGE WORKSHOP IN ROCKS AND MINERALS FOR JUNIOR HIGH SCHOOL AND ELEMENTARY SCHOOL TEACHERS; 1 YEAR; $25,400

AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.; H. A. RODENBLAER; ANIMAL HAUSBANDRY EXCHANGE MISSION TO THE USSR; 6 WEEKS; $1,500

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D.C.; HILARY J. DEASON; TRAVELING HIGH SCHOOL SCIENCE LIBRARY PROGRAM; 1 YEAR; $248,000

DAEL WOLFF; TRAVELING SCIENCE LIBRARIES; 1 YEAR; $248,000

WILLIAM P. VIALL; STUDY OF QUALIFICATIONS AND TEACHING LOADS OF SECONDARY TEACHERS OF SCIENCE AND MATHEMATICS; 14 MONTHS; $56,000

AMERICAN CHEMICAL SOCIETY, WASHINGTON, D.C.; E. B. REUTER; PREPARATION, PRINTING AND DISTRIBUTION OF A CAREER INFORMATION BOOKLET ON CHEMISTRY; 1 YEAR; $11,250

AMERICAN FOUNDATION FOR CONTINUING EDUCATION, CHICAGO, I1L.; JEROME M. ZIEGLER; PROGRAM OF CIVIL RIGHTS EDUCATION IN SCIENCE; 2 YEARS; $30,000

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, WASHINGTON, D.C.; I. T. COX; PREPARATION OF A BIOLOGICAL SCIENCE CAREER MANUSCRIPT; 1 YEAR; $5,880

HAROLD E. OSBORNE, BIOLOGY NEWS BUREAU; CONFERENCE ON SCIENCE INFORMATION; 5 DAYS; $15,000

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, NEW YORK, N.Y.; F. J. VAN AWTORP; ONE-WEEK SPECIAL LECTURE PROGRAM IN ADVANCED ENGINEERING CONCEPTS PERTAINING TO PROCESS DEVELOPMENT BY STATISTICAL METHODS; 1 DAY; $8,100

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, N.Y.; GRANT C. RIGGLE; NEW CHALLENGES TO ELECTRICAL ENGINEERS FROM MEDICAL AND BIOLOGICAL PROBLEMS; 1 DAY; $450

AMERICAN INSTITUTE OF PHYSICS, NEW YORK, N.Y.; R. HANBORN C. BROWN; INTERNATIONAL CONFERENCE ON PHYSICS EDUCATION; 1 YEAR; $14,000

ELMER HUTCHISON; CAREER INFORMATION LITERATURE IN PHYSICS; 1 YEAR; $9,430

ELMER HUTCHISON; THREE SEMINARS FOR SCIENCE WRITERS; 1 DAY EACH; $5,450

WALLACE WATERFALL; TRANSLATION OF RUSSIAN PHYSICS LECTURE DEMONSTRATION MANUALS; 1 YEAR; $9,000

AMERICAN MATHEMATICAL SOCIETY, PROVIDENCE, R.I.; GORDON L. WALKER; FOUR-WEEK SPECIAL FIELD INSTITUTE IN MODERN PHYSICAL THEORETICS; 30 WEEKS; $150,000

YOSHUA UNIVERSITY, NEW YORK, N.Y.; ROMAN VISNIKAV, ALBERT ELSTEIN COLLEGE OF MEDICINE; LIVING BIOLOGY, FILM SERIES; 18 MONTHS; $112,340

OTHE R EDUCATION IN THE SCIENCES GRANTS

ACADEMY OF SCIENCE OF ST. LOUIS, ST. LOUIS, MO.; MURL DUNING; SCIENCE CAREERS PROGRAM; 1 YEAR; $17,850
of August in the Summers of 1961-62-63; 3 years; $23,745

AMERICAN SOCIETY OF LIMNOLOGY AND OCEANOGRAPHY, INC., Woods Hole, Mass.; Bostwick H. Ketchum; Education and Recruitment Committee; 1 year; $3,800

AMERICAN SOCIETY OF ZOLOGISTS, STATE UNIVERSITY OF IOWA, IOWA CITY, IOWA; S. J. Segal, The Rockefeller Institute; Freshwater Course in Metamorphosis in the Animal Kingdom; 2 days; $4,500

AMERICAN SOCIETY OF ZOOLOGISTS, STANFORD UNIVERSITY, STANFORD, CALIF.; Victor C. Twitty; Printing and Distributing a Brochure "Careers in Animal Biology"; 1 year; $2,456

ARIZONA ACADEMY OF SCIENCE, PHOENIX, ARIZ.; HOWARD K. GLOYD; Traveling Science Institute; 1 year; $21,110

ASIA FOUNDATION, SAN FRANCISCO, CALIF.; William L. Ellers; Travel of Foreign Participants in 1960 Summer Institutes; 3 months; $10,400

BOSTON COLLEGE, Chestnut Hill, MASS.; STANLEY J. BEZUZSKA, S. J.; Correspondence Course in Elementary Algebra Treated From the Standpoint of Modern Algebra; 10 weeks; $1,060

BOTANICAL SOCIETY OF AMERICA, INC., NEW YORK, N.Y.; H. C. L. BOLD; Career Information Booklet in the Field of Botany; 1 year; $5,000

BUFFALO STATE UNIVERSITY, WATLHAM, MASS.; KENNETH W. FORD; Special Field Institute in Theoretical Physics; 6 weeks; $32,860

BUFFALO SOCIETY OF NATURAL SCIENCES, BUFFALO MUSEUM OF SCIENCE, BUFFALO, N.Y.; FRED T. HALL; Supplementary Science Program in Biology; 1 year; $12,580

UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.; JERRY NEYMAN; Young Scholars to Attend the Fourth Berkeley Symposium on Mathematical Statistics and Probability; 6 weeks; $8,540

Charles T. Singleton; Study Program in Public Education in Science and Technology; 1 year; $29,925

MYCRO TRIBUS, LOS ANGELES; Special Field Institute on Information Theory Applied to Modern Physics and Engineering; 2 weeks; $5,820

CANTISIUS COLLEGE, BUFFALO, N.Y.; HERMAN A. SZYMANSKI; Institute and Symposium on Gas Chromatography; 3 days; $5,320

CORNELL UNIVERSITY, NORTHFLEET, MNN.; BRUCE POLLOCK; Seminar on Science and the News; 3 days; $10,150

CENTRAL STATE COLLEGE, WILBERFORCE, OHIO; E. H. JOHNSON; Laboratory Training Program for Secondary School Teachers; 3 months; $16,215

CENTRO BRASILEIRO DE PESQUISAS ESECAS, RIO DE JANEIRO, BRASIL; J. LETELO LOPES; Support of U.S. Participants at the Latin American School of Physics; 8 months; $5,500

CHICAGO ACADEMY OF SCIENCE, CHICAGO, ILL.; WILLIAM J. BEECHER; Science Club and Workshop Project; 1 year; $11,040

UNIVERSITY OF CHICAGO, CHICAGO, ILL.; FRANCIE S. CHASE; Six-Day Special Program of Participation by Selected High School Teachers of Science as a Part of the Darwin Centennial Celebration; 6 days; $14,000

CLEVELAND MUSEUM OF NATURAL HISTORY, CLEVELAND, OHIO; JOHN J. DOW; Symposium on the Educational Use of Planaria; 3 days; $5,575

UNIVERSITY OF COLORADO, BOULDER, COLO.; WESLEY E. BRITTLIN; Special Field Institute for Theoretical Physics; 10 weeks; $83,720

COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, FORT COLLINS, COLO.; WALTER E. BENSON; Laboratory Training Program for Secondary School Teachers; 3 months; $12,670

HERMAN M. WELSMAN; SCIENCE NEWS WRITING SEMINAR; 6 days; $13,560

COOPER UNION, NEW YORK, N.Y.; JAMES N. SHAPIRO; Science Week for Teachers; Bureau for Providing Speakers for High School Student Groups and Staffs; 1 year; $4,110

CORNELL UNIVERSITY,ITHACA, N.Y.; PHILIP G. JOHNSON, NEW YORK STATE COLLEGE OF AGRICULTURE; ACADEMIC YEAR RESEARCH PARTICIPATION PROGRAM; 10 months; $14,370

COUNCIL OF CHIEF STATE SCHOOL OFFICERS, NEW YORK, D.C.; EDGAR FULLER; Project for Production of a Supplement to the Purchase Guide to Assist in the Wise Purchase and Use of Materials and Apparatus in Science, Mathematics, and Modern Foreign Languages; 1 year; $9,700

DAVIDSON COLLEGE, DAVIDSON, N.C.; W. G. MCGAVOCK; NONRESIDENT Summer Institute in Mathematics for High School Teachers; 6 weeks; $1,000

UNIVERSITY OF DENVER, DENVER, COLO.; BYRON E. CORN; Coordinating Program of 1960 National Science Foundation Summer Institutes Dealing with the Use of Materials and Apparatus in Science, Mathematics, and Modern Foreign Languages; 1 year; $9,700

BUFFALO STATE UNIVERSITY, WATERTOWN, N.Y.; GILBERT OAKLEY; One-Week Training Conference for the Instructional Staffs of Institutes Dealing with the Physics Course Prepared by the National Science Foundation; 1 week; $28,225

FERROL R. ZACHARIA; Activities of the Physical Science Study Committee Relating to the Use or Adaptation of PS8O Materials by Foreign Governments or Foreign Educational Institutions; 1 year; $24,500

EDUCATIONAL SERVICES, INC., WATERTOWN, MASS.; GILBERT OAKLEY, JR.; One-Week Training Conference for the Instructional Staffs of Institutes Dealing with the Physics Course Prepared by the National Science Foundation; 1 week; $28,225

ENGINERS JOINT COUNCIL, NEW YORK, N.Y.; H. K. JUSTICE; University of Cincinnati; U.S. Mission to the United Pan American Congress on Engineering Education; 1 year; $11,350

ROBERT M. MAHONEY; U.S. EXCHANGE MISSION TO STUDY THE UTILIZATION OF ENGINEERING AND ENGINEERING TECHNICIANS AND THEIR INTERRELATIONSHIP IN THE INDUSTRIAL COMPOSITE OF THE USSR; 6 months; $26,500

WILLIAM H. MIERZYK, NORTHEASTERN UNIVERSITY; ANALYSIS OF 1960 Salaries and Other Professional Earnings of Engineering Faculty Members; 9 months; $7,460

UNIVERSITY OF FLORIDA, GAINESVILLE, FLA.; HERBERT LOWDIN; Special Field Institute in Quantum Chemistry and Solid-State Physics; 5 weeks; $85,500

RAS O. WEINER; SOUTHERN REGIONAL SCIENCE SEMINAR; 3 days; $19,175

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GEORE PEABODY COLLEGE FOR TEACHERS, Nashville, Tenn.; Bennie Carmichael; Cooperative College School Program; 6 weeks; $35,080

HAWAIIAN ACADEMY OF SCIENCES, Honolulu, Hawaii; Donald C. McGuire, University of Hawaii; Hawaiian Science Clubs Service; 1 year; $19,650

JAMES Moomaw; Teachers' Science Seminar Series; 1 year; $1,370

IDAHO ACADEMY OF SCIENCE, UNIVERSITY OF Idaho, Moscow, Idaho; Elmer K. Baunie; Program To Encourage Science Education in Idaho High Schools; 1 year; $15,650

ILLINOIS STATE ACADEMY OF SCIENCE, Jacksonville, Ill.; Robert C. Wallace, MacMurray College; Illinois Junior Academy of Science Program; 1 year; $15,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Samuel Scharge; Chemistry High School-College Teacher Conference; 1 day; $500

INDIANA ACADEMY OF SCIENCES, Indiana University, Bloomington, Ind.; J. Crawford Polley; Program of the Indiana School and College Committee on Mathematics; 1 year; $13,710

IOWA ACADEMY OF SCIENCE, Grinnell College, Grinnell, Iowa; T. B. Porter, University High School, State University of Iowa; Visiting Scientist Program and Publication of Selected Scientific Papers; 1 year; $25,600

JAPAN ENGINEERING TECHNICAL SOCIETY, East Lansing, Mich.; J. D. Ryder, Michigan State University; Preparation and Distribution of Sixteen Academic Units Pertaining to Vocational Guidance Toward Engineering and Technology; 1 year; $17,650

KANSAS ACADEMY OF SCIENCE, Kansas State College of Pittsburg, Pittsburg, Kans.; J. M. Jewett, State Geological Survey, University of Kansas; Science Teaching Improvement Program; 1 year; $31,800

KANSAS STATE TEACHERS COLLEGE, Emporia, Kans.; Otto Smith; Conference of Principals, Supervisors and School Board Members of the Science and Mathematics Teachers Enrolled in the 1960 Summer Institute; 1 day; $1,200

UNIVERSITY OF KANSAS, Lawrence, Kans.; George R. Waggoner; Conference on Special Programs in Science as a Gifted Undergraduate Student in Large Public Universities; 2 days; $11,040

KENTUCKY RESEARCH FOUNDATION, Lexington, Ky.; Douglas W. Schwartz, Museum of Anthropology; Institute in Kentucky Archaeology; 2 surveys; $60,000

LOUISIANA ACADEMY OF SCIENCE, LOUISIANA STATE UNIVERSITY, Baton Rouge, La.; Harry J. Bennett; Expansion and Implementation of Junior Academies of Science; 1 year; $27,750

UNIVERSITY OF LOUISVILLE, Louisville, Ky.; William J. McIlhina; Science Reporting Workshop; 2 days; $4,500

MARYLAND ACADEMY OF SCIENCES, Baltimore, Md.; Thomson King; Course in Astronautics for Teachers of Science in High Schools of Maryland; 1 year; $3,100

Thomson King; The Creation and Circulation of Mobile Science Exhibits Among the Schools of Maryland; 1 year; $15,900

UNIVERSITY OF MARYLAND, College Park, Md.; Joshua R. C. Brown; Visiting Foreign Staff Project for 1960 Summer Institutes in Biological Sciences; 2 months; $30,000

MATHEMATICAL ASSOCIATION OF AMERICA, UNIVERSITY OF BUFFALO, Buffalo, N.Y.; Edward A. Cameron, University of North Carolina; Conference for Summer Institute Teachers of Mathematics; 3 days; $48,000

MATHEMATICAL ASSOCIATION OF AMERICA, TEACHERS COLLEGE, Columbia University, New York, N.Y.; Howard F. Fahr; Survey of European Mathematical Education—Part II; 1 year; $9,200

MATHEMATICAL ASSOCIATION OF AMERICA, UNIVERSITY OF BUFFALO, Buffalo, N.Y.; John R. Mayd, American Association for the Advancement of Science; Program of Visiting Lecturers to Secondary Schools in Mathematics; 2 years; $100,000

METALLURGICAL SOCIETY OF AIME, New York, N.Y.; John Chipman; Careers in Metallurgy; 1 year; $7,500

MICHIGAN ACADEMY OF SCIENCE, ARTS, AND LETTERS, MUSEUM OF PALeONTOLOGY, UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Wayne Taylor; Project To Improve the Status of Science and Mathematics Education in the State of Michigan; 1 year; $20,990

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY, Houghton, Mich.; M. E. Volln; Laboratory Training Program for Secondary School Teachers; 3 months; $225,850

MICHIGAN STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE, East Lansing, Mich.; F. B. Dutton; Traveling Science Demonstration Lecture Program; 1 year; $225,850

E. D. Duffy; Workshop in Microbiology for Secondary School Teachers; 2 weeks; $8,300

MISSISSIPPI ACADEMY OF SCIENCES, INC., DELTA STATE COLLEGE, Cleveland, Miss.; Clyde Q. Sheely; Program To Encourage and Improve Science Education in the High Schools; 1 year; $34,780

UNIVERSITY OF MISSOURI, Columbia, Mo.; R. E. Peck; Conference on College Science Teachers; 1 day; $1,000

MUSEUM SAVES, SCIENCE AND INDUSTRY, Bridgeport, Conn.; Earle W. Newton; Mobile Exhibit Trailer Project; 1 year; $8,000

MUSEUM OF NEW MEXICO, Santa Fe, N. Mex.; Fred Wendorf; Special Field Institute in Archaeology; 5 weeks; $7,840

NASBON COLLEGE, Springdale, Maine; Roger C. Gay; Supplementary Student Science Projects Program; 8 weeks; $18,000

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D.C.; S. S. Wilks; Printing and Distributing 800,000 copies of a Pamphlet Entitled "Careers in Mathematics"; 30 months; $21,000

NATIONAL MERIT SCHOLARSHIP, Evanston, Ill.; John M. Stahr; Study of Institutional Characteristics Related to College Productivity; 2 years; $50,000

NATIONAL OPINION RESPONSE CENTER, Chicago, Ill.; Peter H. Rosen; Planning Statement on Post Enumeration Studies of the 1960 Census of Population; 3 months; $2,500

NEW HAMPSHIRE ACADEMY OF SCIENCE, DARTMOUTH COLLEGE, Hanover, N.H.; Allen L. King; Program To Assist Science Teachers and Students in the Secondary
SCHOOLS IN NEW HAMPSHIRE: 1 year; $6,040
UNIVERSITY OF NEW HAMPSHIRE, Durham, N.H.; M. Evans Monroe; Special Field In-
stitutes; 1 month; $3,500
NEW YORK STATE SOCIETY FOR MEDICAL RE-
SEARCH, Inc., New York, N.Y.; Brian F. Hoft-
man; Summer Workshop on Laboratory
Experiments in Physiology; 6 weeks; $13,150
NEW YORK UNIVERSITY, New York, N.Y.;
Hiller Krieghbaum; Science Writers Semi-
inar; 6 weeks; $4,400
Hiller Krieghbaum; Seminary for Science
Writers; 2 weeks; $16,600
NORTH CAROLINA ACADEMY OF SCIENCE,
Raleigh, N.C.; Herbert E. Speece; Short-
Term Science Institutes for High School
Teachers in North Carolina; 1 year; $19,350
NORTH CAROLINA STATE COLLEGE, Raleigh,
N.C.; T. F. Maki; Special Field Institute in
Forest Biology; 4 weeks; $27,500
UNIVERSITY OF NORTH CAROLINA, Chapel
Hill, N.C.; Normal Neil Luxon; Science
Writers Institute; 6 days; $25,000
Robert G. Carson, Jr.; North Carolina
State College—Other College Cooperative
Association for Science Teachers; 1 year;
$24,770
NORTH TEXAS STATE COLLEGE, Denton,
Texas; L. F. Connell, Jr.; Radiological
Science Conference for Summer Institute
Instructors; 6 months; $9,400
OAK RIDGE INSTITUTE OF NUCLEAR STUDIES,
Inc., Oak Ridge, Tenn.; W. W. Grigorieff;
Teaching Science Demonstration Lecture
Program; 1 year; $206,300
OREBILIN COLLEGE, Oberlin, Ohio; Wade
Ellis; Visiting Foreign Staff Project for 1960
Summer Institutes in Mathematics; 10
months; $20,000
OHIO ACADEMY OF SCIENCE, Columbus, Ohio;
Gerald Acker, Bowling Green State Uni-
versity; The Development and Operation of
Science Days in the State of Ohio; 1 year;
$6,800
OKLAHOMA ACADEMY OF SCIENCE, UNIVERSITY
OF OKLAHOMA, Norman, Okla.; Robert C.
Fite; Oklahoma Junior Academy of Science
Program; 1 year; $2,520
J. Teague Self; Consultation Service for
Community Sponsored Improvement Pro-
gram in Science Education; 1 year; $20,010
OKLAHOMA STATE UNIVERSITY OF AGRICUL-
TURE AND APPLIED SCIENCE, Stillwater, Okla.,
Robert C. Fite; Teaching Science Demon-
stration Lecture Program; 1 year; $250,580
OREGON MUSEUM OF SCIENCE AND INDUSTRY,
Portland, Ore.; Raymond E. Barrett; Field
Research Program for Teachers; 1 year;
$6,180
OREGON STATE COLLEGE, Corvallis, Ore.;
Vernon H. Cheldelli; Biology Colloquium;
1 1/2 days; $6,000
UNIVERSITY OF OREGON, Eugene, Ore.; E. G.
Ebbighausen; Traveling Science Demonstra-
tion Lecture Program; 1 year; $224,780
John L. Hulteng; Conference on Inter-
preting Modern Science to the Public; 6
days; $8,700
ORGANIZATION OF AMERICAN STATES, Wash-
ington, D.C.; Jesse D. Perkins; Coopera-
tive Program for an Inter-American Ex-
change of Scientists; 2 years; $55,000
Jesse D. Perkins; Travel of Foreign
Participans in 1960 Summer Institute; 2
months; $700
ORGANIZATION FOR EUROPEAN ECONOMIC
COOPERATION, Paris, France; L. Vincent,
STURBRIDGE UNIVERSITY RESEARCH INSTITUTE, SYRACUSE, N.Y.; W. R. LE PAGE; CONFERENCE ON AEROSOL ENGINEERING EDUCATION; 2 DAYS; $4,890

STURBRIDGE UNIVERSITY RESEARCH INSTITUTE, COLLENDALE CAMPUS, SYRACUSE, N.Y.; ALFRED T. COLLETT; VISITING FOREIGN STAFF PROJECT FOR ACADEMIC YEAR INSTITUTES DURING 1966-67; 1 YEAR; $51,500

TEMPLE UNIVERSITY, PHILADELPHIA, PA.; EMER T. OFFENBACHER; VISITING FOREIGN STAFF PROJECT FOR 1966 SUMMER INSTITUTES IN PHYSICAL SCIENCES; 10 MONTHS; $34,850

TEXAS ACADEMY OF SCIENCE, VANDERBILT UNIVERSITY, NASHVILLE, TENN.; MYRON S. McCAY; EXPANSION AND IMPLEMENTATION OF THE PROGRAM OF SCIENCE; 1 YEAR; $10,000

ARLO I. SMITH; SHORT TERM SCIENCE INSTITUTES FOR HIGH SCHOOL TEACHERS; 1 YEAR; $16,870

TEXAS ACADEMY OF SCIENCE, UNIVERSITY OF TEXAS, AUSTIN, TEX.; CHARLES LA MOTTÉ, A. M. COLLEGE OF TEXAS; VISITING CONFERENCE FOR PROMISING SCIENCE STUDENTS IN THE JUNIOR AND SENIOR HIGH SCHOOL OF TEXAS; 1 YEAR; $10,750

UNIVERSITY OF TEXAS, AUSTIN, TEX.; HOWARD T. ODUM, INSTITUTE OF MARINE SCIENCE; SPECIAL FIELD INSTITUTE; 2 MONTHS; $4,060

UNIVERSITY OF UPPSALA, UPPSALA, SWEDEN; PER-OLOV LOWDIN; 1960 INTERNATIONAL SUMMER INSTITUTE IN QUANTUM CHEMISTRY; 6 MONTHS; $9,000

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, WASHINGTON, D.C.; LAWRENCE S. DERTHICK; 1966 STUDENTS ENROLLED FOR ADVANCED DEGREES; 1 YEAR; $18,000

UNIVERSITY OF VERNON, BURLINGTON, V.T.; HOWARD M. SMITH, JR.; SYMPOSIUM ON EDUCATIONAL FRONTS IN BIOMEDICAL ENGINEERING; 2 DAYS; $7,000

UNIVERSITY OF WASHINGTON, SEATTLE, WASH.; JOSEPH L. MCCARTHY; PROGRAM FOR COLLEGE-UNIVERSITY ASSOCIATION IN THE TEACHING OF SCIENCE; 1 YEAR; $30,360

WESTERN KENTUCKY STATE COLLEGE, BOWLING GREEN, KY.; KELLY THOMPSON; CONFERENCE ON TEACHER PARTICIPATION IN SCIENCE; 2 DAYS; $3,750

WESTLING COLLEGE, WHEELING, W. VA.; JESSE M. ALTHAB; ONE-DAY WORKSHOP IN CHEMISTRY FOR SCIENCE TEACHERS; 7 MONTHS; $2,875

UNIVERSITY OF WISCONSIN, MADISON, WIS.; DONALD M. BUCKLIN; TWO-DAY SPECIAL MEETING OF 1960-61 HIGH SCHOOL TEACHER RESEARCH PARTICIPANTS; $450

R. D. WAGNER; IN-SERVICE PROGRAM OF STUDIES OF BASIC CONCEPTS OF MATHEMATICS BY DIRECTED GROUP AND INDIVIDUAL STUDY USING CORRESPONDENCE STUDY MATERIALS; 1 YEAR; $40,700

WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MASS.; W. V. R. MALKUS; THREE MONTH SUMMER PROGRAM OF THEORETICAL STUDIES IN GEOPHYSICAL FLUID DYNAMICS; 3 MONTHS; $13,450

WASHINGTON ACADEMY OF SCIENCES, WASHINGTON, D.C.; JOHN K. TAYLOR; SCIENCE EDUCATION PROGRAM; 1 YEAR; $34,990

WASHINGTON STATE UNIVERSITY, PULLMAN, WASH.; WILLIAM W. ELMENDORF; FIELD SCHOOL IN ETHNOGRAPHY; 8 WEEKS; $5,085

POLICY STUDIES

COMMISSION OF LABOR STATISTICS, WASHINGTON, D.C.; EWAN C. CLARKE; COST INDEX APPLICABLE TO RESEARCH AND DEVELOPMENT BUDGETS; 7 TO 8 MONTHS; $18,000

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.; S. D. CORNELL; ACTIVITIES OF THE COMMITTEE ON ATMOSPHERIC SCIENCES; 1 YEAR; $36,800

U.S. BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, WASHINGTON, D.C.; ROBERT W. BURGESS; STUDY OF 200 INDUSTRIAL FIRMS REPORTING MORE THAN $50,000 IN BASIC RESEARCH DURING 1967 TO DETERMINE EXTENT OF PUBLICATION OF RESEARCH; 1 YEAR; $4,600

ROBERT W. BURGESS; SURVEY OF RESEARCH AND DEVELOPMENT COSTS OF INDUSTRY—ORIENTED ORGANIZATIONS—DURING 1958; 1 YEAR; $11,000

MAX R. CONKLIN; SURVEY OF RESEARCH AND DEVELOPMENT COSTS OF INDUSTRY-ORIENTED ORGANIZATIONS; 1 YEAR; $75,000

SCIENTIFIC MANPOWER

ENGINEERS JOINT COUNCIL, NEW YORK, N.Y.; WILLIAM H. MIERNY; ANALYSIS OF 1960 SALARY AND OTHER PROFESSIONAL EARNINGS OF ENGINEERING FACULTY MEMBERS; 9 MONTHS; $7,450

LIBRARY OF CONGRESS, WASHINGTON, D.C.; LEO ORLOUS; STUDY OF COMMUNIST CHINA'S SCIENTIFIC TECHNICAL MANPOWER; FISCAL YEAR 1960-61; $500

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.; M. H. TRYTTEN; CONTINUATION OF REVIEWS OF THE 1960-61 REGISTRY OF SCIENTIFIC AND TECHNICAL PERSONNEL; 6 MONTHS; $12,125

NATIONAL SCIENCE TEACHERS ASSOCIATION, WASHINGTON, D.C.; HENRY H. CARLTON; REGISTRY OF HIGH SCHOOL SCIENCE AND MATHEMATICS TEACHERS; 6 MONTHS; $21,500

ROBERT H. CARLTON; 1960-61 REGISTRY OF HIGH SCHOOL SCIENCE AND MATHEMATICS TEACHERS; 1 YEAR; $31,000

U.S. BUREAU OF LABOR STATISTICS, DEPARTMENT OF LABOR, WASHINGTON, D.C.; EWAN C. CLARKE; 1960 SURVEY OF INDUSTRIAL EMPLOYMENT OF SCIENTIFIC AND TECHNICAL PERSONNEL; 1 YEAR; $85,000

U.S. OFFICE OF EDUCATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, WASHINGTON, D.C.; CLAYTON D. HUTCHINSON; FEDERAL FUNDS FOR SCHOOL EDUCATION; $38,000

U.S. WEATHER BUREAU, WASHINGTON, D.C.; ROY L. FOX; NATIONAL WEATHER RECORDS CENTER, ASHEVILLE, N.C.; COMPUTER PROGRAM FOR THE 1956-59 NATIONAL REGISTER OF SCIENTIFIC AND TECHNICAL PERSONNEL DATA; 1 YEAR; $9,000

FOREIGN SCIENCE EVALUATION SURVEYS

CARL O. SAUER, BERKELEY, CALIF.; SURVEY OF GEOGRAPHY IN WESTERN GERMANY, SWITZERLAND AND AUSTRIA; 3 MONTHS; $3,500

UNIVERSITY OF TEXAS, AUSTIN, TEX.; JACKSON W. FOSSER; REVIEW OF MICROBIOLOGY IN JAPAN; 4 MONTHS; $5,325

A. D. WALLACE, TULANE UNIVERSITY OF LOUISIANA, NEW ORLEANS, LA.; PREPARATION OF A REPORT ON MATHEMATICAL ACTIVITY IN POLAND; 3 MONTHS; $100
CONFERENCES IN SUPPORT OF SCIENCE

AMERICAN INSTITUTE OF NUTRITION, Washington, D.C.; Milton O. Lee; Fifth International Congress on Nutrition; 6 days; $20,000

AMERICAN MATHEMATICAL SOCIETY, Providence, R.I.; Gordon L. Walker; Conference on Differential Equations; 6 days; $18,100

Gordon L. Walker; Directors of University Computing Laboratories; June 1960; $18,100

AMERICAN PHYSICAL SOCIETY, Princeton, N.J.; Shirley L. Quimby; Conference on Plasma Physics; 8 days; $600

AMERICAN SOCIETY OF ZOOLOGISTS, State University of Iowa, Iowa City, Iowa; Emil Witschi; Regional Developmental Biology Conferences; 1 year; $4,000

UNIVERSITY OF ARIZONA, Tucson, Ariz.; A. R. Kassander; Conference on the Surface Chemistry of Ice Nucleation; 18 months; $12,500

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Kenneth L. Downes, Jr.; Second International Symposium on Rarefied Gas Dynamics; 4 days; $8,500

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; J. J. Nassau; Conference on Astronomical Observations From Above the Earth's Atmosphere; 1 day; $1,400

UNIVERSITY OF CHICAGO, Chicago, Ill.; T. R. Hogness; Symposium on Optical Spectroscopic Measurements of High Temperatures; 1 year; $7,500

N. Rashevsky; International Symposium Mathematical Theories of Biological Phenomena; 1 year; $5,500

Eric R. Wolf; Conference on Archaeological Research in the Valley of Mexico; 4 months; $2,000

UNIVERSITY OF COLORADO, Boulder, Colo.; Frank Kreith; Heat Transfer Conference at the Annual AIME Meeting (1960); 1 year; $4,600

COLUMBIA UNIVERSITY, New York, N.Y.; George K. Smelser; The Structure of the Eye; 1 week; $6,000

GEOPHYSICAL SOCIETY, GEOPHYSICAL LABORATORY, Washington, D.C.; Robert M. Garrels, Massachusetts Institute of Technology; Conference on Geochemistry of Carbonate Minerals and Rocks; 5 days; $4,980

GORDON RESEARCH CONFERENCES, UNIVERSITY OF RHODE ISLAND, Kingston, R.I.; W. George Parks; Gordon Conference on Photoneutral Reactions; 5 days; $6,000

HARVARD UNIVERSITY, Cambridge, Mass.; L. L. Engel and C. A. Villee, Massachusetts General Hospital, Boston; Conference on Mechanisms of Action of Steroid Hormones; 3 days; $6,800

Wardly W. Leontief; International Conference on Input-Output Analysis; 7 days; $24,000

HIGH ALTITUDE OBSERVATORY OF THE UNIVERSITY OF COLORADO, Boulder, Colo.; Walter Orr Roberts; International Cross-Field Seminar on Solar-Weather Relationships; 8 days; $1,800

HISTOCHEMICAL SOCIETY, WASHINGTON UNIVERSITY, St. Louis, Mo.; Oliver H. Lowry; Symposium on the Histochernistry of the Nervous System; 1 year; $800

HISTORY OF SCIENCE SOCIETY, Ithaca, N.Y.; Henry M. Hoenig; Fourth International Congress of the History of Science; Summer, 1960; $40,000

HISTORY OF SCIENCE SOCIETY, CORNELL UNIVERSITY, Ithaca, N.Y.; Nathan Reingold; Conference on Science Manuscripts; 2 days; $4,000

JHUPTON HOPKINS UNIVERSITY, Baltimore, Md.; William D. McKelroy, Megatherzal Laboratory for Biology; Symposium on Light and Life; 4 days; $7,000

LONG ISLAND BIOLOGICAL ASSOCIATION, Cold Spring Harbor, L.I.; Arthur Chacek; Symposium on Biological Clocks and Animal Navigation; 10 days; $7,835

LOWELL OBSERVATORY, Flagstaff, Ariz.; J. S. Hall; Conference on Polarization of Stars; 24 days; $2,492

MANHATTAN COLLEGE, New York, N.Y.; W. Wesley Eckenfelder, Jr.; Third Biological Waste Treatment Conference; 3 days; $5,200

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Walter A. Rosenblith; The Role of Computer Techniques in Research on Brain Functions and Behavior; 2 days; $10,000

METALLURGICAL SOCIETY OF AIME, New York, N.Y.; John Chipman; Conference on the Necessity of Materials to High Velocity Deformation; 1 year; $5,500

Empton H. Roll; First International Powder Metallurgy Conference; 1 year; $3,000

MITCHELL RESEARCH INSTITUTE, Kansas City, Mo.; Bruce Daniel; 1960 International Conference on the Nature of Solid Friction; September 1960; $5,300

MISSOURI BOTANICAL GARDEN, St. Louis, Mo.; Robert L. Dressler; A Conference on Systematics at the Missouri Botanical Garden; 1 year; $1,800

UNIVERSITY OF MISSOURI, Columbia, Mo.; G. B. Clark; Sixth Annual Symposium on Mining Research; 1 week; $7,000

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, Washington, D.C.; Frank L. Campbell; Symposium (1) On Mutations (Fall 1960) and (2) On Statistics (Spring 1961) In Genetics; $15,000

Frank L. Campbell; Symposium on Comparative Studies of Fanning, Ultraviolet, and Visible Radiation; 4 days; $15,500

Frank L. Campbell; Tropical Botanical Problems of Concern to the United States; 3 days; $8,100

John S. Coleman; Committee on Symbols, Units and Nomenclature (Sum); 2 years; $5,000

John S. Coleman; Conference on Atomic Masses; $3,000

John S. Coleman; Survey of the Transportation Problem, Woods Hole, Massachusetts; 1 year; $35,000

John S. Coleman; Symposium on Magneto-Fluid Dynamics; 7 days; $10,000

John S. Coleman; U.S. Committee of the International Union of Pure and Applied Physics; 2 years; $5,000

John S. Coleman; Third Astronomical Conference; Argentina; 1 week; $7,000

G. D. Meld; Support of COSPAR; 1 year; $5,000

Richard C. Vetter; Support to the Special Committee on Oceanic Research of the International Council of Scientific Unions; 1 year; $47,400

UNIVERSITY OF NEW MEXICO, Albuquerque, N. Mex.; Guido H. Danh; Organic Scintillation Detectors; 3 days; $4,400

NEW YORK STATE VETERINARY COLLEGE, CORNELL UNIVERSITY, Ithaca, N.Y.; Morley
R. Kare: Physiological and Behavioral Aspects of Taste; 1 year; $1,000

University of Pittsburgh, Pittsburgh, Pa.: N. E. Wagner: Symposium on Subdwarf Stars; 1 day; $2,680

PROVISIONAL INTERNATIONAL COMPUTATION CENTER, Roma-Zona dell'E.U.R., Italy: Symposium—Numerical Treatment of Ordinary Differential, Integral and Integral-Differential Equations; 5 days; $7,000

PURDUE RESEARCH FOUNDATION, Lafayette, Ind.: Solomon Gartenhaus: Midwest Conference on Theoretical Physics; 2 days; $2,000

KUTZKUR, THE STATE UNIVERSITY, New Brunswick, N.J.: Michael Heidelberg and Otto J. Plescia; Immuno-Chemical Approaches to Problems in Microbiology; 3 days; $12,250

Leslie A. Stauber: Conference on the Physiology of Parasitism; 2 days; $1,600

SOCIAL SCIENCE RESEARCH COUNCIL, New York, N.Y.: Joseph H. Greenberg; Conference on Language Universals; 1 year; $10,900

SOCIETY FOR THE STUDY OF DEVELOPMENT AND GROWTH, Brandeis University, Waltham, Mass.; Edgar Zwilling; Nineteenth Growth Symposium; 3 days; $5,000

SOCIAL SCIENCE RESEARCH SOCIETY, Madison, Wis.; Emil Truog; General Support of the VII International Soil Science Congress; 6 months; $10,000

STANFORD RESEARCH INSTITUTE, Menlo Park, Calif.; Nevin K. Hiester; International Symposium on High Temperature Technology; 3 days; $8,500

University of Texas, Austin, Tex.; T. C. Hsu, M. D. Anderson Hospital and Tumor Institute; Support of a Symposium on the Cell Physiology of Neoplasia; 3 days; $6,700

WASHINGTON UNIVERSITY, St. Louis, Mo.; Herman N. Elliot; Continuing Workshop on Antibody Synthesis; 1 year; $8,400

University of Washington, Seattle, Wash.; Ernst Florey; International Symposium on Nervous Infection; 7 days; $18,000

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; Arthur G. Steenbg; A Symposium on Genetics; 1 month; $29,900

WORCESTER POLYTECHNIC INSTITUTE, Worcester, Mass.; Arthur B. Bronwell; Conference on Research Goals; 2 days; $8,000

ATTENDANCE AT INTERNATIONAL MEETINGS

Advanced Study Institute Sponsored by the North Atlantic Treaty Organization, Corfu, Greece:

Jules de Laynq, Naval Research Laboratory, Washington, D.C.: J. Robert Schrooffer, Universitetscte Institut for Teoretisk Fysik, Copenhagen, Denmark

All-Union Conference on Organic Catalysis, Moscow, Russia:

Robert L. Burton, Jr.; Northwestern University, Evanston, Ill.

Carbon-14 Conference, Groningen, Netherlands:

Meyer Rubin, Geochemistry and Petrology Branch, United States Geological Survey, Washington, D.C.

Colloquium of the Research Film Section of the International Scientific Film Association, Roscoff, France:

Leslie P. Greenhill, Pennsylvania State University, University Park, Pa.

Colloquium on Thin Shell Structures, Delt, Holland:

Nicholas John Hoff, Stanford University, Stanford, Calif.

Committee on International Pharmaceutical Documentation, Zurich, Switzerland:

Winifred Sewell, Librarian, Squibb Institute for Medical Research, New Brunswick, N.J.

Conducting Lectures at the Universities of Hamburg and Erlangen, Hamburg and Erlangen, West Germany:

Otto M. Nikodym, Kenyon College, Gambier, Ohio

Conference on Computing Methods and the Phase Problem in X-ray Crystal Analysis, Glasgow, Scotland:


Yoshinohara, Okayama, Pennsylvania State University, University Park, Pa.

Raymond Pepinsky, Pennsylvania State University, University Park, Pa.

Vladimir Vand, Pennsylvania State University, University Park, Pa.

Conference on Functional Analysis, Warsaw, Poland:

Richard F. Arens, University of California, Los Angeles, Calif.

Edward Hewitt, University of Washington, Seattle, Wash.

Robert C. James, Harvey Mudd College, Claremont, Calif.

Ernest A. Michael, University of Washington, Seattle, Wash.

John R. Kettler, University of North Carolina, Chapel Hill, N.C.

Elias M. Stein, University of Chicago, Chicago, Ill.

Marshall H. Stone, University of Chicago, Chicago, Ill.

Conference on Magnetism of the British Institute of Physics, Schefield, England:

Richard M. Bozorth, Bell Telephone Laboratories, Murray Hill, N.J.

Conference on Metabolism and Synthesis of DNA, La Jolla, Belgium:

Frederick H. Kasten, Texas A & M Agricultural and Mechanical College, College Station, Tex.

Conference on Sensory Anomalies in Strabismus, Bern, Switzerland:

Hermann N. Burian, State University of Iowa, Iowa City, Iowa

Conference of the Society on Biological Rhythms, Siena, Italy:

Franz Halberg, University of Minnesota Medical School, Minneapolis, Minn.

Colin S. Pittendrigh, Princeton, N.J.

Course on Mathematics, Programming and Technical Aspects of Electronic Computing Installations, Technical University, Darmstadt, Germany:

Ross H. Flenner, Digital Computer Laboratory, University of Illinois, Urbana, Ill.

Donald A. Ludwig, New York University, New York, N.Y.

Course for Physics Teachers in Secondary Schools, Meina and Salzburg, Austria:

William S. Burton, George School, Bucks County, Pa.

Robert Lagemann, Munchen, Germany

Uri Haber-Schaim, Education Services, Inc., Cambridge, Mass.
Delivering a Series of Lectures in Polish

University:

 Delivering a Series of Lectures in Polish

Dynamic Systems and Ergodic Theories,

Varennna, Italy:

Ecological Symposium on Productivity of Plant Communities, Stuttgart-Hohenheim, Germany:

Lawrence C. Bliss, University of Illinois, Urbana, Ill.

Eighteenth General Assembly, International Pharmaceutical Federation, Copenhagen, Denmark:

Anne McCann, Squibb Institute for Medical Research, New Brunswick, N.J.

Eighth Congress of the International Society of Hematology, Tokyo, Japan:

International Society of Hematology, Brookline, Mass.

Eighth International Grassland Congress, Reading, England:

Arthur L. Brundage, Alaska Agricultural Experiment Station, Palmer, Alaska

Marvin P. Bryant, Agricultural Research Center, Beltsville, Md.

Douglas S. Chambless, North Carolina State College, Raleigh, N.C.

Lorin E. Harris, Utah State University, Logan, Utah

Wilton W. Reimann, Washington State University, Pullman, Wash.

Donald F. Hervey, Colorado State University, Fort Collins, Colo.

Carl Soren Hoveland, Auburn University, Auburn, Ala.

Horton M. Laude, University of California, Davis, Calif.

Henry L. Lucas, Jr., North Carolina State College, Raleigh, N.C.

Marshall E. McCullough, Georgia Experiment Station, Experiment, Ga.

Gerald O. Mott, Purdue University, Lafayette, Ind.

Charles E. Olmsted, University of Chicago, Chicago, Ill.

Maurice L. Peterson, University of California, Davis, Calif.

J. Thomas Reid, Cornell University, Ithaca, N.Y.

Damon C. Shelton, West Virginia University, Morgantown, W. Va.

Edwin W. Tisdale, University of Idaho, Moscow, Idaho

John R. Washko, Pennsylvania State University, University Park, Pa.


Xth International Congress of Entomology, Vienna, Austria:

Entomological Society of America, Washington, D.C.

Eleventh International Congress of Historical Sciences, Stockholm, Sweden:

Pedro Armillans, University of Michigan, Ann Arbor, Mich.

Enzyme Commission, Cambridge, England and Paris, France:

Sidney P. Colowick, Vanderbilt University, Nashville, Tenn.

Albert L. Lehninger, Johns Hopkins School of Medicine, Baltimore, Md.

Evaluation of the Soviet Research and Training Program in Geography. Association of American Geographers, Army Research Office, OCRI, Department of the Army, Washington, D.C.:

Frances L. Friedman, Physical Science Study Committee, Educational Services Incorporated, Cambridge, Mass.

Exchange of Scientists Between the U.S. and U.S.S.R.:

National Academy of Sciences—National Research Council, Washington, D.C.

Exchange Visit—Russia; East-West Contacts Program:

Richard M. Bosworth, Bell Telephone Laboratories, Murray Hill, N.J.

Executive Committee and Bureau of the International Union on Pure and Applied Chemistry, Leningrad, Russia:

William Albert Noyes, Jr., University of Rochester, Rochester, N.Y.

Faraday Society Conference on Cell Nucleus, Cambridge, England:

Walter S. Vincent, Marine Biological Laboratory, Woods Hole, Mass.

Faraday Society Discussions on "Oxidation-Reduction Reactions in Ionizing Solvents," Newcastle-on-Tyne, England:

Rudolph A. Marcus, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

W. K. Wilmarth, University of Southern California, Los Angeles, Calif.

Faraday Society Discussions on the Physical Chemistry of Aerosols, Bristol, England:

Frank T. Gucker, Indiana University, Bloomington, Ind.

Federation Internationale de Documentation, Warsaw, Poland:


Milton O. Lee, Federation of American Societies for Experimental Biology, Washington, D.C.

Fifth Austrian Congress of Mathematicians, Innsbruck, Austria:

Victor L. Klee, Jr., Matematik Institut, Copenhagen, Denmark

Erwin Kleinfeld, Ohio State University, Columbus, Ohio

Fifth International Conference on Semiconductors, Prague, Czechoslovakia:

Ephraim Banks, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

Raymond Bowers, Cornell University, Ithaca, N.Y.

Ralph Bray, Purdue University, Lafayette, Ind.

Frederick C. Brown, University of Illinois, Urbana, Ill.

Joseph Callaway, University of Miami, Coral Gables, Fla.

Armand Fontaine, Syracuse University, Syracuse, N.Y.

Stefan Machlup, Western Reserve University, Cleveland, Ohio

Fifth International Congress of Biochemistry, Moscow, Russia:

U.S. National Committee for the International Union of Biochemistry, University of Utah, Salt Lake City, Utah

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First All-Union Congress on Theoretical and Applied Mechanics, Moscow, Russia:
Wallace D. Hayes, Princeton University, Princeton, N.J.
Nicholas L. Hoff, Stanford University, Stanford, Calif.

First Congress, International Federation of Automatic Control, Moscow, Russia:
Sheldon S. L. Chang, New York University, New York, N.Y.
Robert Lien Cochrane, Rockefeller State Hospital, Orangeburg, N.Y.

First All-Union Congress on Theoretical and Automatic Control, Moscow, Russia:
Arthur M. Hopkin, University of California, Berkeley, Calif.
Richard W. Jones, Northwestern University, Evanston, Ill.
Louis Frank Kazda, University of Michigan, Ann Arbor, Mich.

First International Congress of Endocrinology, Copenhagen, Denmark:
James Arthur Peters, San Fernando Valley State College, Northridge, Calif.

Fourth International Congress of Endocrinology, Copenhagen, Denmark:
Endocrine Society, Oklahoma City, Okla.
First South American Congress of Zoology, La Plata, Argentina:
James Arthur Peters, San Fernando Valley State College, Northridge, Calif.

48th Annual Meeting of the International Council for the Exploration of the Sea, Moscow, Russia:
Donald P. de Sylva, University of Delaware, Newark, Del.

47th Session of Indian Science Congress, Bombay, India, and the Pakistan Science Conference, Sind, Pakistan:
Elbert Payson Little, Physical Science Study Committee, Educational Services Incorporated, Cambridge, Mass.

First International Congress on Cosmical Gas Dynamics, Torreus, Italy:
Leverett Davis, Jr., California Institute of Technology, Pasadena, Calif.

Fourth International Congress, European Organization of Quality Control, London, England:
George E. P. Box, University of Wisconsin, Madison, Wis.

Fourth International Symposium on the Reactivity of Solids, Amsterdam, Netherlands:
Joseph A. Pask, University of California, Berkeley, Calif.

Fourth Symposium on Cosmical Gas Dynamics, Torreus, Italy:
Leverett Davis, Jr., California Institute of Technology, Pasadena, Calif.

Fourth Symposium on Virus Diseases of Fruit Trees in Europe, Copenhagen, Denmark:
John A. Milbrath, Oregon State College, Corvallis, Oreg.
Daniel F. Millikan, University of Missouri, Columbia, Mo.
George Nyland, University of California, Davis, Calif.
Gilbert L. Stout, Bureau of Plant Pathology, State of California, Sacramento, Calif.

Glossary Subcommittee of the International Committee of Coal Petrology, Madrid, Spain:
William Spackman, The Pennsylvania State University, University, Pa.

Hungarian Academy of Science and the Mathematics Department of Charles University, Prague, Czechoslovakia:
Johannes Wolfowitz, Cornell University, Ithaca, N.Y.

International Association of Geomagnetism and Aeronomy, Copenhagen, Denmark:
Frances N. Frenkel, David Taylor Model Basin, Washington, D.C.
Morris Neuberger, Lutry, Switzerland

International Colloquium on Biochemistry of Glucosides, Paris, France:
David S. Feingold, University of California, Berkeley, Calif.
Dexter French, Iowa State College, Ames, Iowa
William Zevald, University of California, Berkeley, Calif.

Fourth Symposium on Cosmic Gas Dynamics, Torreus, Italy:
Leverett Davis, Jr., California Institute of Technology, Pasadena, Calif.

Fourth International Symposium on the Reactivity of Solids, Amsterdam, Netherlands:
Joseph A. Pask, University of California, Berkeley, Calif.

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Leverett Davis, Jr., California Institute of Technology, Pasadena, Calif.

Fourth Symposium on Cosmic Gas Dynamics, Torreus, Italy:
Leverett Davis, Jr., California Institute of Technology, Pasadena, Calif.
International Colloquium on Function Theory, Bombay, India:
Lipman Bers, Institute of Mathematical Sciences, New York University, New York, N.Y.
Louis Nirenberg, Institute of Mathematical Sciences, New York University, New York, N.Y.
International Commission for the Nomenclature of Cultivated Plants, Cambridge, England:
George H. M. Lawrence, Cornell University, Ithaca, N.Y.
Martin G. Weis, Plant Industry Station, Beltsville, Md.
International Conference on Functional Analysis, Warsaw, Poland:
Vicente L. Klee, Jr., Matematisk Institut, Copenhagen, Denmark
International Conference on Hall Storms, Verona, Italy:
Louis J. Batten, The University of Arizona, Tucson, Ariz.
Horace R. Byers, The University of Chicago, Chicago, Ill.
Charles L. Heisler, Jr., The Pennsylvania State University, University Park, Pa.
Heinz W. Kaseimir, Neptune, N.J.
Paul B. Mac Cready, Jr., Atmospheric Research Group, Altadena, Calif.
Vincent J. Schaefer, American Meteorological Society, Schenectady, N.Y.
Richard A. Schlesener, Colorado State University, Fort Collins, Colo.
International Conference on Many-Body Problems, Utrecht, the Netherlands:
A. E. Glassgold, The University of California, Berkeley, Calif.
Joaquin M. Luttinger, University of California, Philadelphia, Pa.
David Pines, University of Illinois, Urbana, Ill.
J. Robert Schrieffer, University of Illinois, Urbana, Ill.
Harry Subl, Bell Telephone Laboratories, Murray Hill, N.J.
International Conference on Physics Education, Paris, France:
Melba Phillips, Washington University, St. Louis, Mo.
International Conference on Science in the Advancement of New States, Rehovoth, Israel:
Louis J. Batten, The University of Arizona, Tucson, Ariz.
Lloyd V. Berkner, Associated Universities, Inc., New York, N.Y.
W. C. Lowdermilk, Berkeley, Calif.
Alvin M. Weinberg, Oak Ridge National Laboratory, Oak Ridge, Tenn.
International Conference on the Teaching of Anthropology, Burg Wartenstein, Austria:
Ernst M. Albert, University of California, Berkeley, Calif.
International Congress of Embryology, Italy:
National Academy of Sciences—National Research Council, Washington, D.C.
International Congress on Histochemistry, Paris, France:
National Academy of Sciences—National Research Council, Washington, D.C.
International Congress on Microwave Tubes, Munich, Germany:
Walter R. Beam, Rensselaer Polytechnic Institute, Troy, N.Y.
Abraham Bers, Research Laboratory of Electronics, Cambridge, Mass.
Charles K. Birdsall, University of California, Berkeley, Calif.
Karl J. Spangenberg, Stanford University, Stanford, Calif.
International Congress on Photobiology, Copenhagen, Denmark:
National Academy of Sciences—National Research Council, Washington, D.C.
International Federation for Documentation Conference, Rio de Janeiro, Brazil:
Bryan C. Vickery, Herts, England
International Information Theory Meeting, London, England:
Murray Eden, Massachusetts Institute of Technology, Cambridge, Mass.
Merrill M. Flood, University of Michigan, Ann Arbor, Mich.
Edmund M. Glaser, The Johns Hopkins University, Baltimore, Md.
David M. Green, Massachusetts Institute of Technology, Cambridge, Mass.
Robert G. Grossman, Walter Reed Army Institute of Research, Washington, D.C.
Kenneth E. Iverson, Harvard University, Cambridge, Mass.
International Institute of Refrigeration, Commission 2; Commission 9 and Technical Board, Belgrade, Yugoslavia:
Carl F. Kayan, Columbia University, New York, N.Y.
International Kollegium Uber Endliche Gruppen, Oberwolfach, West Germany:
William W. Boone, University of Illinois, Urbana, Ill.
John Griggs Thompson, Institute for Defense Analyses, Princeton, N.J.
International Meeting on Veterinary Education, London, England:
Glen C. Holm, Oklahoma State University, Stillwater, Okla.
International Mineralogy Association, Zurich, Switzerland:
Brian H. Mason, The American Museum of Natural History, New York, N.Y.
International Organization for Standards—Fourth Plenary Meeting, Technical Committee ISO/TC37—Terminology, West Berlin, Germany:
Jerrold Orne, The University of North Carolina, Chapel Hill, N.C.
International Summer Institute in Quantum Chemistry, Uppsala, Sweden:
Norman W. Basley, University of Maryland, College Park, Md.
David W. Fox, University of Maryland, College Park, Md.
International Symposium on the Chemistry of Natural Products, Melbourne, Canberra, and Sydney, Australia:

Roger Adams, University of Illinois, Urbana, Ill.

Kinus Biemann, Massachusetts Institute of Technology, Cambridge, Mass.

William B. Cook, Montana State College, Bozeman, Mont.

William C. Dauben, The University of California, Berkeley, Calif.

Carl D. Djerassi, Stanford University, Stanford, Calif.

Jerome F. Eastham, University of Tennessee, Knoxville, Tenn.

Theodore A. Gellman, The University of California, Los Angeles, Calif.

Robert E. Ireland, University of Michigan, Ann Arbor, Mich.

S. Morris Kupchan, The University of Wisconsin, Madison, Wis.

Nelson J. Leouard, University of Illinois, Urbana, Ill.

Carl R. Noller, Stanford University, Stanford, Calif.

S. William Petietter, The Rockefeller Institute, New York, N.Y.

Paul J. Scheuer, University of Hawaii, Honolulu, Hawaii

George H. Stout, University of Washington, Seattle, Wash.

International Symposium on Drugs Affecting Lipid Metabolism, Milan, Italy:

Roslyn B. Alfin-Slater, The University of California, Los Angeles, Calif.

Nicholas R. Difulchio, University of Tennessee, Memphis, Tenn.

James R. Mend, The University of California Medical Center, Los Angeles, Calif.

Erwin H. Mosbach, Columbia University Research Service, New York, N.Y.

David A. Turner, Biochemistry Research Division, Baltimore, Md.

International Symposium on Macromolecular Chemistry, Moscow, Russia:

Werner W. Brandt, Illinois Institute of Technology, Chicago, Ill.

Paul Doty, Harvard University, Cambridge, Mass.

Frederick R. Eirich, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

Paul J. Flory, Mellon Institute, Pittsburgh, Pa.

Jan Hermans, State University, College of Forestry at Syracuse University, Syracuse, N.Y.

Maurice Higgins, Stanford Research Institute, Menlo Park, Calif.

Carl S. Marvel, University of Illinois, Urbana, Ill.

Robert Simha, University of Southern California, Los Angeles, Calif.

Robert Ullman, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

International Symposium on Macromolecules, Wiebaden, Germany:

Gaetano F. D'Alelio, University of Notre Dame, Notre Dame, Ind.


International Symposium on Pseudomonas/ Achromobacter, Bangor, Wales:

John C. Ayres, Iowa State University, Ames, Iowa

International Symposium on Vitamins, Poznan, Poland:

B. Connor Johnson, University of Illinois, Urbana, Ill.

International Union of Crystallography, Cambridge, England:

Sidney C. Abraham, Brookhaven National Laboratories, Upton, N.Y.

LEROY Et. Alexander, Mellon Institute, Pittsburgh, Pa.

Massa Atolli, Iowa State University, Ames, Iowa

Harry Brummerber, Syracuse University, Syracuse, N.Y.

Martin J. Buerger, Massachusetts Institute of Technology, Cambridge, Mass.

Lawrence F. Dahl, University of Wisconsin, Madison, Wis.

J. C. Grossekuts, Midwest Research Institute, Kansas City, Mo.

David Harker, Roswell Park Memorial Institute, Buffalo, N.Y.

Edward W. Hughes, California Institute of Technology, Pasadena, Calif.

George A. Jeffrey, University of Pittsburgh, Pittsburgh, Pa.

James D. McCullough, The University of California, Los Angeles, Calif.

Lynne A. Merritt, Jr., Indiana University, Bloomington, Ind.


Emilina Post, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

Paul W. Schmidt, University of Missouri, Columbia, Mo.

Martin E. Straumann, University of Missouri, Rolla, Mo.

Bertram E. Warren, Massachusetts Institute of Technology, Cambridge, Mass.

Jurg Waser, California Institute of Technology, Pasadena, Calif.

Elisabeth A. Wood, Bell Telephone Laboratories, Murray Hill, N.J.

Ralph W. G. Wyckoff, University of Arizona, Tucson, Ariz.

W. H. Zachariasen, The University of Chicago, Chicago, Ill.

International Volcanological Association, International Union of Geodesy and Geophysics, Paris, France:

Gordon A. Macdonald, Volcano, Hawaii

Lectures on Molecular Quantum Mechanics, Sao Paulo, Rio de Janeiro, Brazil, and Buenos Aires, Argentina:

Martin Karplus, University of Illinois, Urbana, Ill.

Lecture at Several Universities in Poland During the Month of June 1960:

John F. Miller, Harvard University, Cambridge, Mass.

Meeting of the Bureau (Officers and Council) of the Federation Internationale de Documentation, Paris, France:

Milton O. Lee, Federation of American Societies for Experimental Biology, Washington, D.C.

Meeting of the Commission on Pharmacy Abstracts, Copenhagen, Denmark:

Winifred Sewell, Squibb Institute for Medical Research, New Brunswick, N.J.

Meeting of the Federation Internationale de Documentation, Warsaw, Poland:

Fred R. Cagle, Research Coordinator, Tulane University of Louisiana, New Orleans, La.
Meeting of the International Society of Horticulture Science, Rotterdam, Holland:

Mathematical Institute of the Polish Academy of Sciences, Warsaw, Poland:
Antonio Zygmund, The University of Chicago, Chicago, Ill.

NATO Advanced Study Institute, Breukelen, The Netherlands:
Robert Alden Fish, Chicago, Ill.
John Eldon Gaustad, Princeton University, Princeton, N.J.
John McKim Mallville, University of Colorado, Boulder, Colo.
Dimitri M. Milhas, California Institute of Technology, Pasadena, Calif.
Robert A. R. Parker, California Institute of Technology, Pasadena, Calif.
Peter Oliver Vandervoort, National Radio Astronomy Observatory, Greenbank, W. Va.
Andrew Tipton Young, Harvard College Observatory, Cambridge, Mass.

NATO Advanced Study Institute, Edinburgh, Scotland:
Michael J. Moravcsik, University of California, Livermore, Calif.
William C. Ramsay, University of California, Los Angeles, Calif.

NATO Advanced Study Institute, Les Houches, France:
Thomas Laurence Trueman, Chicago, Ill.

NATO Advanced Study Institute, Manchester, England:
Charles T. Prewitt, Massachusetts Institute of Technology, Cambridge, Mass.
Richard H. Stanford, Jr., California Institute of Technology, Pasadena, Calif.
Bernhardt John Wuensch, Massachusetts Institute of Technology, Cambridge, Mass.

NATO Advanced Study Institute, Varenna, Italy:
John T. Lyman, The University of California, Berkeley, Calif.
Jan Polissar, Harvard University, Boston, Mass.

Natural Rubber Research Conference, Kuala Lumpur, Malaysia:
Howard J. Teas, University of Florida, Gainesville, Fla.

Nineteenth International Geographical Congress, Stockholm, Sweden:
Wallace E. Akin, Drake University, Des Moines, Iowa
Carleton P. Barnes, U.S. Department of Agriculture, Washington, D.C.
Lloyd D. Black, U.S. Department of Commerce, Garrett Park, Md.
David J. M. Hooson, University of Maryland, College Park, Md.
Peter H. Nash, University of Cincinnati, Cincinnati, Ohio
Laurence H. Noble, Northwestern University, Evanston, Ill.

Theodore Shabad, American Geographical Society, New York, N.Y.

John C. Sherman, University of Washington, Seattle, Wash.
David A. Smith, The Pennsylvania State University, University Park, Pa.
David D. Smith, Coastal Studies Institute, Manteo, N.C.
Edwin N. Thomas, State University of Iowa, Iowa City, Iowa
Edward L. Ullman, Washington University, St. Louis, Mo.

James E. Vance, Jr., University of California, Berkeley, Calif.

Phase Transitions and Anomalous Dispersion, Osaka, Japan:
Thomas E. Dyne, Department of Chemistry, Villanova University, Villanova, Pa.

Photonuclear Conference, Karlsruhe, Germany:
Heinrich A. Medicus, Rensselaer Polytechnic Institute, Troy, N.Y.
Paul F. Yergin, Rensselaer Polytechnic Institute, Troy, N.Y.

Daniel J. Zaffarano, Iowa State University, Ames, Iowa.

Physical Chemistry of Aerosols, Bristol, England:
Frank T. Gucker, Indiana University, Bloomington, Ind.

Preliminary Field Survey and Planning of Nubian Archaeology, Los Angeles, California to Nubia, Egypt:
Clement W. Melghan, the University of California, Los Angeles, Calif.

Preparation of a Volume of Mathematical Tables Required by Statisticians, London, England:
Herman Otto Hartley, Iowa State University, Ames, Iowa.

Scientific Conference of the Department of Fluid Mechanics, Augustow, Poland:
Frederick Sterling Sherman, the University of California, Berkeley, Calif.

Second All-Union Conference on Nuclear Reactions at Low and Intermediate Energies, Moscow, Russia:

Second Hungarian Mathematical Congress, Budapest, Hungary:
Einar Hille, Yale University, New Haven, Conn.
Victor L. Klee, Jr., Mathematisch Instituut, Copenhagen, Denmark

Second International Congress of Bioclimatology and Biometeorology, London, England:
A. Nelson Dingle, the University of Michigan, Ann Arbor, Mich.
Edwin W. King, Clemson College, Clemson, S.C.
Frederick Sargent, II, University of Illinois, Urbana, Ill.
Richard David Schein, the Pennsylvania State University, University Park, Pa.
John A. Sealander, Jr., University of Arkansas, Fayetteville, Ark.

Gerald B. Spurr, the University of Tennessee College of Medicine, Memphis, Tenn.

George G. Zabka, State University of Iowa, Iowa City, Iowa
Second International Congress on Catalysis, Paris, France:
John E. Benson, the Pennsylvania State University, University Park, Pa.
Robert E. Burwell, Jr., Northwestern University, Evanston, Ill.
John J. Chessick, Lehigh University, Bethlehem, Pa.
Joseph D. Danforth, Grinnell College, Grinnell, Iowa.
H. E. Farnsworth, Brown University, Providence, R.I.
Owen Kim, Princeton University, Princeton, N.J.
Ernest M. Loebel, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.
Giuseppe Parravano, the University of Michigan, Ann Arbor, Mich.
Herman Pines, Northwestern University, Evanston, Ill.

Second International Course of Lyophilization, Lyon, France:
John W. McGlade, Washington, D.C.

Second World Conference on Earthquake Engineering, Tokyo and Kyoto, Japan:
Glen V. Berg, University of Michigan, Ann Arbor, Mich.
Eric Willa Clough, the University of California, Berkeley, Calif.
C. Martin Duke, the University of California, Los Angeles, Calif.
Donald E. Hudson, California Institute of Technology, Pasadena, Calif.
Richard L. Jennings, University of California, Los Angeles, Calif.
Joseph Penzien, Massachusetts Institute of Technology, Cambridge, Mass.
Karl V. Steinbrugge, the University of California, Berkeley, Calif.
William T. Thomson, the University of California, Los Angeles, Calif.
Mark P. White, University of Massachusetts, Amherst, Mass.

Seminar on Aerial Survey Methods and Equipment Economic Commission for Asia and the Far East (ECAFE), Bangkok, Thailand:
Shirley V. Griffith, Executive Office of the President, Bureau of the Budget, Washington, D.C.

Seminar on the Status and Development of the Teaching of Chemistry:
Robert Rice, Berkeley High School, Berkeley, Calif.
J. Arthur Campbell, Harvey Mudd College, Claremont, Calif.
Laurence B. Strong, Earlham College, Richmond, Ind.
Paul Westmeyer, University of Illinois, Urbana, Ill.

Seventh International Conference on Coastal Engineering, The Hague, Netherlands:
Donald K. E. Hurlbunt, Massachusetts Institute of Technology, Cambridge, Mass.
Douglas Lamar Inman, the University of California, La Jolla, Calif.
Joe W. Johnson, the University of California, Berkeley, Calif.
Robert L. Wiegell, the University of California, Berkeley, Calif.

Seventeenth International Congress of Pure and Applied Science, Munich, Germany:
John C. Ballaz, Jr., University of Illinois, Urbana, Ill.
Richard deChamars, Washington University, St. Louis, Mo.
Donald E. Dulany, Jr., University of Illinois, Urbana, Ill.
Horace B. English, Ohio State University, Columbus, Ohio.
Edwin A. Fleishman, Yale University, New Haven, Conn.
Donald G. Forgays, Rutgers, The State University, New Brunswick, N.J.
Jacob L. Gewirtz, The Hebrew University, Jerusalem, Israel.
Eleanor J. Gibson, Cornell University, Ithaca, N.Y.
J. C. Glueckstein, University of Wisconsin, Madison, Wis.
Albert E. Goss, University of Massachusetts, Amherst, Mass.
Harold Guilliksen, Princeton University, Princeton, N.J.
Davis H. Howes, Massachusetts Institute of Technology, Cambridge, Mass.
Tracy S. Kendler, Columbia University, New York, N.Y.
Nathan S. Kogan, Educational Testing Service, Princeton, N.J.
Sheldon J. Korchin, National Institute of Mental Health, Bethesda, Md.
Herschel W. Liebowitz, University of Wisconsin, Madison, Wis.
Kenneth MacCorquodale, University of Minnesota, Minneapolis, Minn.
William J. McGill, Columbia University, New York, N.Y.
Walter Mischel, Harvard University, Cambridge, Mass.
Alvin John North, Southern Methodist University, Dallas, Tex.
Carl Pfaffman, Brown University, Providence, R.I.
Bertram H. Raven, The University of California, Los Angeles, Calif.
Harold Schlosberg, Brown University, Providence, R.I.
Arnold W. Small, Jr., State University of Iowa, Iowa City, Iowa.
Joan S. Stamm, Institute of Living, Hartford, Conn.
Joseph Charles Stevens, Harvard University, Cambridge, Mass.
John W. Thibaut, The University of North Carolina, Chapel Hill, N.C.
Philip G. Zimbardo, Yale University, New Haven, Conn.

Sixth International Congress of Anthropological and Ethnological Sciences, Paris, France:
Joseph B. Casagrande, Social Science Research Council, New York, N.Y.
Donald Collier, Chicago Natural History Museum, Chicago, Ill.
Henry B. Collins, Smithsonian Institution, Washington, D.C.
Edward P. Dodier, Bagulo City, Philippines.
Gordon F. Ekholm, American Museum of Natural History, New York, N.Y.
Emil W. Haury, University of Arizona, Tucson, Ariz.
E. Adamson Hoebel, University of Minnesota, Minneapolis, Minn.
John J. Honigmann, University of North Carolina, Chapel Hill, N.C.
Keith R. Porter, Cytology Department, The Rockefeller Institute, New York, N.Y.
Sixth National Conference of the Czechoslovakian Society for Electron Microscopy, Smolenice, Czechoslovakia:
Bartołomiej Smolen, Warsaw, Poland.
Bariloche, Argentina:
E. John L. Bell, University of Chicago, Chicago, Illinois.
Reactions, Paris, France:
Richard P. Feynman, California Institute of Technology, Pasadena, Calif.
Structure of Graphite and Kinetics of Its Reduction, Paris, France:
Stanislaw Mrozowski, University of Buffalo, Buffalo, N.Y.
Summer Institute of Physics, San Carlos de Bariloche, Argentina:
Donal W. Connors, Argonne National Laboratory, Lemont, Ill.
Support of Travel of American Scientists to the University of Oxford Symposium on the History of Science, Oxford, England:
Survey of Biometeorology in Europe:
Helmut E. Landsberg, U.S. Weather Bureau, Washington, D.C.
Symposium on the Biology of Space Travel, London, England:
Harlow Shapley, Peterborough, N.H.
Symposium on Linear Spaces, Jerusalem, Israel:
Richard F. Arens, the University of California, Los Angeles, Calif.
Leon Ehrenpreis, Yeshiva University, New York, N.Y.
Henry Helson, the University of California, Berkeley, Calif.
Victor L. Klee, Jr., Mathematical Institute, Kobenhavn, Denmark.
Peter Lax, New York University, New York, N.Y.
Richard J. Lax, University of California Institute of Technology, Pasadena, Calif.
George W. Mackey, Harvard University, Cambridge, Mass.
Ralph S. Phillips, the University of California, Los Angeles, Calif.
Angus E. Taylor, the University of California, Los Angeles, Calif.
John Wermer, Brown University, Providence, R.I.
Symposium on Macromolecular Structure and Biological Function, Stockholm, Sweden:
Vincent G. Allfrey, the Rockefeller Institute, New York, N.Y.
Daniel I. Aronson, the University of California, Berkeley, Calif.
Erwin Chargaff, Columbia University, New York, N.Y.
Albert Dorfman, University of Chicago, Chicago, Ill.
Albert W. Frenkel, University of Minnesota, Minneapolis, Minn.
David E. Green, the University of Wisconsin, Madison, Wis.
P. Edmund Hunter, Jr., Washington University School of Medicine, Saint Louis, Mo.
Andre T. Jagendorf, the Johns Hopkins University, Baltimore, Md.
Martin D. Kamen, Brandeis University, Waltham, Mass.
Henry A. Lardy, the University of Wisconsin, Madison, Wis.
Albert L. Lehninger, the Johns Hopkins School of Medicine, Baltimore, Md.
George E. Palade, the Rockefeller Institute, New York, N.Y.
Gertrude E. Perlmutter, Rockefeller Institute, New York, N.Y.
Keith R. Porter, the Rockefeller Institute, New York, N.Y.
Maynard E. Pullman, the Public Health Research Institute, New York, N.Y.
Thomas F. Singer, Edsel B. Ford Institute for Medical Research, Detroit, Mich.
Birgit Vennesland, University of Chicago, Chicago, Ill.
Christophe Henri Werner, Brookhaven National Laboratory, Upton, N.Y.
Symposium on Membrane Transport and Metabolism, Prague, Czechoslovakia:
Emil Aschheim, New York, N.Y.
Halvor N. Christensen, the University of Michigan, Ann Arbor, Mich.
Vincent Paul Cirillo, Seton Hall College of Medicine and Dentistry, Jersey City, N.J.
Robert E. Crane, Washington University Medical School, Saint Louis, Mo.
Ernest C. Foulkes, the May Institute for Medical Research, Cincinnati, Ohio.
H. O. Halvorson, College of Agriculture, Madison, Wis.
Lowell E. Hokin, University of Wisconsin, Madison, Wis.
Harmon L. Houghter, New York University College of Medicine, New York, N.Y.
Alexander Leafl, Harvard Medical School, Boston, Mass.
Charles R. Park, Vanderbilt University Medical School, Nashville, Tenn.
Robert L. Post, Vanderbilt University Medical School, Nashville, Tenn.
Howard V. Rickenberg, University of Washington, Seattle, Wash.
Symposium on the Methods of the Mammalian Investigation, Brno, Plzen, Czechoslovakia:
E. Raymond Hall, University of Kansas, Lawrence, Kan.
Symposium on Metrology (Standardization) of Radionuclides, Vienna, Austria:
George G. Manov, Technical Director, Tracerlab, Incorporated, Richmond, Calif.
Brian David Pate, Washington University, Saint Louis, Mo.
Symposium on the Numerical Treatment of Ordinary Differential Equations, Integral and Integro-Differential Equations, Rome, Italy:
H. A. Antosiewics, University of Southern California, Los Angeles, Calif.
Richard Courant, New York University, New York, N.Y.
Joaquin B. Diaz, University of Maryland, College Park, Md.
Jim Douglas, Jr., Rice Institute, Houston, Texas
Paul R. Garabedian, New York University, New York, N.Y.
Jurgen Moser, New Rochelle, N.Y.
John A. D. California Institute of Technology, Pasadena, Calif.
Symposium on Polarization of Nucleons, Basel, Switzerland:
Fred H. Schmidt, University of Washington, Seattle, Wash.
Symposium on Protein Biosynthesis, Amsterdam, Netherlands:
James Bonner, California Institute of Technology, Pasadena, Calif.
Fred Lipman, the Rockefeller Institute, New York, N.Y.
Alfred E. Mirsky, the Rockefeller Institute, New York, N.Y.
George C. Webster, the Ohio State University, Columbus, Ohio
Symposium on Scientific Problems of Plant Protection, Budapest, Hungary:
Robert N. Goodman, University of Missouri, Columbia, Mo.
Symposium on the Visual System, Freiburg, Germany:
Russell L. De Valois, Indiana University, Bloomington, Ind.
Robert W. Doty, the University of Michigan, Ann Arbor, Mich.
Dorothea J. Hurvich, New York University, New York, N.Y.
Edward F. MacNichol, Jr., the Johns Hopkins University, Baltimore, Md.
Symposium at the Wetsmann Institute, Roehovth, Israel and Lecture Series in Utrecht, Holland:
S. M. Ulam, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.
Tenth International Astrophysical Symposium, Liege, Belgium:
Joseph Wyan Chamberlain, the University of Chicago, Williams Bay, Wis.
Thomas Gold, Cornell University, Ithaca, N.Y.
Leo Goldberg, the University of Michigan, Ann Arbor, Mich.
William Lilley, the University of Michigan, Ann Arbor, Mich.
A. E. Lilley, Harvard University, Cambridge, Mass.
William A. Rense, University of Colorado, Boulder, Colo.
Fritts Bohrlich, State University of Iowa, Iowa City, Iowa
Edward P. Todd, University of Colorado, Boulder, Colo.
Tenth International Congress of Applied Mechanics, Stras5, Italy:
Ferdinand P. Beer, Lehigh University, Bethlehem, Pa.
Yuan Cheng Bertram Fung, California Institute of Technology, Pasadena, Calif.
Werner Goldsmith, the University of California, Berkeley, Calif.
G. E. H. Handelman, Rensselaer Polytechnic Institute, Troy, N.Y.
Robert M. Haythornthwaite, the University of Michigan, Ann Arbor, Mich.
Rudolf Herman, University of Minnesota, Minneapolis, Minn.
Mikloso Hetcanyi, Northwestern University, Evanston, Ill.
Stephen Juhass, Southwest Research Institute, San Antonio, Tex.
Geoffrey S. S. Ludford, University of Maryland, College Park, Md.
Ernest F. Magnus, the University of Michigan, Ann Arbor, Mich.
Julius Miklowitz, California Institute of Technology, Pasadena, Calif.
John W. Miles, University of California, Los Angeles, Calif.
Paul K. Panay, Rice Institute, Houston, Tex.
Milton S. Pleasent, California Institute of Technology, Pasadena, Calif.
Sho-Chun Shen, University of Maryland, College Park, Md.
Walter W. Sorrens, University of California, Berkeley, Calif.
Walter G. Vincenti, Stanford University, Stanford, Calif.
Joseph Harris Weinber, Columbia University, New York, N.Y.
Alexander Weinsten, University of Maryland, College Park, Md.
Max L. Williams, Jr., California Institute of Technology, Pasadena, Calif.
Tenth International Congress for Cell Biology, Paris, France:
National Academy of Sciences—National Research Council, Washington, D.C.
Third International Conference on Medical Electronics, London, England:
A. L. Hopkins, Western Reserve University, Cleveland, Ohio.
Third Symposium on Gas Chromatography, Edinburgh, Scotland:
Warren W. Brandt, Purdue University, Lafayette, Ind.
Henry Freiser, The University of Arizona, Tucson, Ariz.
Nicolaas Bloembergen, Harvard University, Cambridge, Mass.
Rufus G. Fellers, University of South Carolina, Columbia, S.C.
Roy Walter Gould, California Institute of Technology, Pasadena, Calif.
Evans R. C. Jordan, University of Illinois, Urbana, Ill.
Laurence A. Manns, Stanford University, Stanford, Calif.
Nathan Marcuvitz, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.
Adler A. Othmer, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.
Allan M. Peterson, Stanford University, Stanford, Calif.
Samuel Silver, The University of California, Berkeley, Calif.
Twelfth General Assembly International Union of Geodesy and Geophysics—Continued

R. C. Haymes, New York University, New York, N.Y.
J. F. Hennen, Lamont Geological Observatory, Palisades, N.Y.
D. W. Hood, Agricultural and Mechanical College of Texas, College Station, Tex.
R. Howard, University of Massachusetts, Amherst, Mass.
J. A. Knauss, University of California, La Jolla, Calif.
W. B. Kreb, California Institute of Technology, Pasadena, Calif.
E. R. LaChapelle, University of Washington, Seattle, Wash.
M. G. Landisman, Lamont Geological Observatory, Palisades, N.Y.
H. Leinbach, University of Alaska, College, Alaska
S. Matsuhashi, University of Colorado, Boulder, Colo.
R. P. Meyer, University of Wisconsin, Madison, Wis.
F. O. Ostoph, Department of Commerce, Washington, D.C.
E. C. Ray, State University of Iowa, Iowa City, Iowa
M. E. Rees, University of Alaska, College, Alaska
R. O. Reid, Agricultural and Mechanical College of Texas, College Station, Tex.
M. K. Robinson, University of California, La Jolla, Calif.
R. L. Shreve, University of California, Los Angeles, Calif.
W. Stander, Department of Geophysics and Geophysical Engineering, St. Louis, Mo.
T. Takahashi, Box 1164, Alfred, N.Y.
E. Thiel, University of Wisconsin, Madison, Wis.
S. B. Treves, University of Nebraska, Lincoln, Nebr.
W. W. Vickara, Ohio State University, Columbus, Ohio
V. Herzon, Scripps Institution of Oceanography, La Jolla, Calif.
L. Wallace, University of Chicago, Williams Bay, Wis.

Twenty-fifth International Congress of Orientalists, Moscow, Russia:
Fred Adelman, University of Pittsburgh, Pittsburgh, Pa.
Richard K. Beardseley, the University of Michigan, Ann Arbor, Mich.
Morton H. Fried, Columbia University, New York, N.Y.
Lawrence Krader, American University, Washington, D.C.

Twenty-first International Geological Congress, Copenhagen, Denmark:
Victor T. Allen, Saint Louis University, St. Louis, Mo.
Orville L. Bandy, University of Southern California, Los Angeles, Calif.
Herbert H. Becker, the New York Botanical Garden, New York, N.Y.
Carl S. Benson, University of Alaska, College, Alaska
William B. N. Berry, University of California, Berkeley, Calif.

D. L. Blackstone, Jr., University of Wyoming, Laramie, Wyo.
Wallace M. Cady, Montpellier, Vt.
Kenneth E. Caster, University of Cincinnati, Cincinnati, Ohio
Charles W. Chessman, California State Department of Natural Sciences, San Francisco, Calif.
Alfred Cohen, Mellon Institute, Pittsburgh, Pa.
Byron N. Cooper, Virginia Polytechnic Institute, Blacksburg, Va.
Richard V. Dietrich, Virginia Polytechnic Institute, Blacksburg, Va.
Gordon P. Eaton, University of California, Riverside, Calif.
D. Jerome Fisher, University of Chicago, Chicago, Ill.
Clifford B. Frondel, Harvard University, Cambridge, Mass.
Julian R. Goldsmith, University of Chicago, Chicago, Ill.
Cornelius S. Hurlbut, Jr., Harvard University, Cambridge, Mass.
Grover E. Murray, Louisiana State University, Baton Rouge, La.
Willard H. Parsons, Wayne State University, Detroit, Mich.
Troy L. Pewe, University of Alaska, College, Alaska
Francis P. Shepard, Scripps Institution of Oceanography, La Jolla, Calif.
E. T. Timothy Whitten, Northwestern University, Evanston, Ill.

Twenty-sixth Conference, International Federation for Documentation, Rio de Janeiro, Brazil:
Allen Kent, Western Reserve University, Cleveland, Ohio

UNESCO Arid Lands Symposium, Paris, France:
William D. Schorger, the University of Michigan, Ann Arbor, Mich.

Visit and Lecture at the Czechoslovakian Academy of Biological Sciences, Prague, Czechoslovakia:
Paul H. Maurer, University of Michigan, Ann Arbor, Mich.

Visit and Lecture at the Czechoslovakian Academy of Biological Sciences, Prague, Czechoslovakia:
Paul H. Maurer, University of Michigan, Ann Arbor, Mich.

Visit and Lecture at the Czechoslovakian Academy of Biological Sciences, Prague, Czechoslovakia:
Paul H. Maurer, University of Michigan, Ann Arbor, Mich.

Visit and Working in Laboratories in the U.S.S.R. During the Summer of 1960, Leningrad and Moscow, Russia:
Jack Frumkin, Basle, Switzerland
The Translation and Publication of the 1959 Issues of the Russian Journal, "Soil Science"; 1 year; $49,464


Study of Physics Publishing Problems; 3 years; $105,700


Support of the 1960 Issues of the Translation and Publication of the Physics Section of the Russian Journal, Doklady; 1 year; $28,700

Support for the Translation and Publication of the 1960 Issues of the Russian Journal of Experimental and Theoretical Physics; 1 year; $53,500

The 1959 Issues of an English Edition of the Russian Journal "Crystallography"; 1 year; $15,725

The Translation and Publication of the 1959 Issues of the Russian Journal "Astronomy"; 1 year; $25,850

The Translation and Publication of the 1959 Issues of a New Russian Journal "Solid State Physics"; 1 year; $50,800

Translation and Publication of the Russian Journal, "Progress of Physical Sciences"; 1 year; $9,000

AMERICAN MATHEMATICAL SOCIETY, Providence, R.I.; Continued Partial Support for the Publication of "Mathematical Reviews"; 1 year; $54,900

Emergency Support of the Transactions of the American Mathematical Society; 1 year; $13,400

Extension of the Translation of Selected Russian Mathematical Articles Project; 1 year; $26,570

Survey of Contemporary Chinese Mathematical Research To Study Translation Needs and the Preparation of Reviews of Chinese Mathematical Articles; 1 year; $43,105

Translation and Publication of Three Russian Books: "Some Applications of Functional Analysis in Mathematical Physics;" "Some Questions in the Theory of Moments;" and "Theory of Analytic Functions of Several Complex Variables;" 1 year; $18,105

Translation of the Pure Mathematics Section of "The Proceedings of the U.S.S.R. Academy of Science—Doklady;" 6 months; $11,587

AMERICAN METEOROLOGICAL SOCIETY, Boston, Mass.; Preparation and Publication of a Backlog of Abstracts and a Decennial Index for "Meteorological Abstracts and Bibliography"; 2 years; $156,250

AMERICAN MICROSCOPICAL SOCIETY, MONTANA STATE COLLEGE, Bozeman, Mont.; Harold W. Manter; Partial Support for Reprinting Back Issues of the Transactions of the American Microscopical Society; 2 years; $11,470

AMERICAN MICROSCOPICAL SOCIETY, THE UNIVERSITY OF NEBRASKA, Lincoln, Nebr.; Preparation and Publication of a Cumulative Index to Volumes 1-50 of the "Transactions of the American Microscopical Society;" 2 years; $10,000
AMERICAN MUSEUM OF NATURAL HISTORY, New York, N.Y.; Publication of Two Monographs on Texas Permian Invertebrates; 1 year; $5,000

AMERICAN PHILOSOPHICAL ASSOCIATION, New York University, New York, N.Y.; Translation and Critique of Selected Works of Some Leading Polish Logicians; 1 year; $8,600

AMERICAN ROCKY MOUNTAIN ASSOCIATION, Inc., New York, N.Y.; Selected Translation of Russian Material in the Field of Astronautics; 1 year; $55,408

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, New York, N.Y.; Continued Support for Preparation and Publication of the Russian Journal "Applied Mathematics and Mechanics, 1969 Series;" 1 year; $33,000

Partial Support for the Publication of a "Bibliography on Gas Turbines 1899-1948;" 1 year; $4,500

Translation and Publication of the 1935 Issues of the Russian Journal, "Trenie I Imos V Mashinat" (Friction and Wear in Machinery) 1 year; $6,300

AMERICAN STATISTICAL ASSOCIATION, Washington, D.C.; Publication of an Analytical Index to the "Journal of the American Statistical Association, Volumes 55-56 (1940-55);" 1 year; $18,000

ARCTIC INSTITUTE OF NORTH AMERICA, Washington, D.C.; Translation and Publication of Inuit Language Publications in Anthropology; 1 year; $38,734

ASSOCIATION FOR ASIAN STUDIES, Ann Arbor, Mich.; A Study of Publishing and Information Services in the Social, Natural and Applied Sciences in Mainland China for the Period 1949-59; 2 years; $25,530

ASSOCIATION OF SPECIAL LIBRARIES AND INFORMATION BUREAUS, London, England; Comparative Efficiency of Indexing Systems; 18 months; $16,700

BERNICE P. BISHOP MUSEUM, Honolulu, Hawaii; Establishment of a Pacific Science Information Center; 1 year; $5,500

BIOLOGICAL ABSTRACTS, UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa.; Continued Operation of Service of Coverage of "Biological Abstracts;" 1 year; $150,000

BOISE JUNIOR COLLEGE, Boise, Idaho; A Study of Reproductive Cycles in California Ameicolas; 6 months; $300

BOSTON UNIVERSITY, Boston, Mass.; Publication of "A Study of Navaho Windcups;" 2 years; $4,000

BUREAU OF THE CENSUS, Washington, D.C.; Bibliography of Social Science Periodicals and Monographs Published in Selected Difficult Languages; 1 year; $45,000

CALIFORNIA BOTANICAL SOCIETY, San Francisco State College, San Francisco, Calif.; "Index to Plant Chromosome Numbers;" 2 years; $3,150

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, Calif.; Preparation of Illustrations for Volume II of "Catalogue of Galaxies and Clusters of Galaxies;" 1 year; $5,750

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.; Completion of the Manuscript "The Nervous System in Invertebrates;" 20 months; $15,000

CAMBRIDGE LANGUAGE RESEARCH UNIT, Cambridge, England; New Logico-Mathematical Methods for the Analysis of Languages for Machine Translation; 1 year; $5,500

Research on New Techniques for Classification: The Theory of Clumps; 1 year; $14,800

CASE INSTITUTE OF TECHNOLOGY, Cleveland, Ohio; Preparation of a Bibliography of Statistical Computer Routines; 1 year; $12,700

An Operations-Research Study of the Scientific-Research Practices of Chemists and Physicists and an Analysis of Economics of Publication of Leading Chemical Journals; 8 months; $5,000

Research on Measurement of Value of Recorded Scientific Information; 6 months; $16,500

CHEMICAL ABSTRACTS SERVICE, THE OHIO STATE UNIVERSITY, Columbus, Ohio; Research on Chemical Documentation—Project I; 1 year; $69,800

Research on the Semantic Content of Chemical Literature; 1 year; $57,900

Study of a New Publication "Key Work in Chemical Context," KWIN; 1 year; $150,000

COLORADO STATE UNIVERSITY RESEARCH FOUNDATION, Fort Collins, Colo.; Study Leading to the Establishment of an Abstracting Service Covering Soils and Water; 9 months; $22,000

CORNELL UNIVERSITY, Ithaca, N.Y.; Continued Support for the Bibliography of Extraterrestrial Radio Noise; 16 months; $18,500

ENGINEERING CONVENTION COUNCIL, New York, N.Y.; An Investigation, Evaluation, and Report on the Current Availability of Polytechnical Dictionaries and Technical Glossaries, and an Examination of the Need for Additional Dictionaries in Engineering and Scientific Fields; 5 months; $175

ENTOMOLOGICAL SOCIETY OF AMERICA, College Park, Md.; Partial Support for the Compilation of Noncurrent Volumes of the "Index to the Literature of American Economic Entomology;" 2 years; $28,300

FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, Washington, D.C.; Partial Support for the Office of Biological Handbooks; 2 years; $40,000

FORDHAM UNIVERSITY, New York, N.Y.; Preparation of a Book on the Chemistry and Biochemistry of Lignin; 1 year; $4,000

FREE UNIVERSITY OF BRUSSELS, Brussels, Belgium; Continued Support for the Physico-Chemical Constants of Binuclear Compounds in Concentrated Solutions; 2 years; $15,000

GHESCHMICAL SOCIETY, Washington, D.C.; Publication of Geobotanical Methods for Geological Investigations; 1 year; $1,510

Translation of Five Russian Monographs on Earth Sciences; 1 year; $18,500

GEORGE WASHINGTON UNIVERSITY, Washington, D.C.; The Biology of the Clostridia; 6 months; $5,925

UNIVERSITY OF GEORGIA, Athens, Ga.; Publication of a World Monograph of the Genus Hypothenemus; 1 year; $5,200

HARVARD UNIVERSITY, Cambridge, Mass.; Preparation and Publication of a "Reference Catalogue of Bright Galaxies;" 1 year; $5,800

Publication of "Indox Nominaam Lichenorum Annis 1944-58 Vulgatorum;" 1 year; $11,850

Research on Automatic Translation of Russian into English; 1 year; $200,000

UNIVERSITY OF ILLINOIS, Urbana, Ill.; Publication of the Monograph "Sex and Age Ratios in North American Ducks;" 1 year; $4,600
INDIANA UNIVERSITY FOUNDATION, Bloomington, Ind.; Symposium Concerning a National Program for the Systematic Evaluation, Selection, Abstracting, and/or Translation, Publication, and Dissemination of Russian and East European Linguistic Literature; 1 year; $8,925

INSTITUTE FOR THE ADVANCEMENT OF MEDICAL COMMUNICATION, New York, N.Y.; Extension and Completion of a Previously Initiated Survey Entitled 'Metabolism of New Scientific Information'; 1 year; $2,500


IOWA STATE UNIVERSITY, Ames, Iowa; Revision of Handbook of Freshwater Fishery Biology; 1 year; $12,000

Iowa University Press, Ames, Iowa; Publication of "Flora of Missouri" by Julian A. Steyermark; 1 year; $15,000

JOURNAL OF CHEMICAL EDUCATION, Wooster, Ohio; Preparation and Publication of a Technical Information Index; 1 year; $8,000

LIBRARY OF CONGRESS, Washington, D.C.; Assembling of a Union Card Catalog of Oriental Vernacular Serials in the U.S. and Canadian Libraries; 1 year; $11,000


Publication of Part I of a Monthly "World List of Future International Meetings," 1 year; $15,000

Publication of the Monthly Index of Russian Accessions and East European Accessions Index; 1 year; $86,000

References Center for Reports on Government-Supported Scientific Research; 1 year; $22,000

LINGUISTIC SOCIETY OF AMERICA, University of California at Los Angeles, Los Angeles, Calif.; Partial Support of the Ninth International Congress of Linguists; 3 months; $25,000

LOLLY LIBRARY AND MUSEUM, Cincinnati, Ohio; Publication of Bibliography of American Paleobotany: 1955-57; 1 year; $500

MARRIOTT CATION INSTITUTE OF TECHNOLOGY, Cambridge, Mass.; Basic Research on Methods of Translating Languages by Machine; 1 year; $125,000

Continued Support for the Translation and Publication of 1959 Issues of English Editions of Three Russian Journals; Radio Engineering; Radio Engineering and Electronics; and Telecommunications; 1 year; $11,000

Study Into the Dissemination of Scientific and Technical Information in the U.S.S.R.; 2 years; $44,217

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich.; Publication of "Essays in the Science of Cereals," Edited by Dele and Cenitro; 1 year; $4,675

UNIVERSITY OF MINNESOTA, Minneapolis, Minn.; Partial Support for the Preparation of Annual Critical Reviews of Heat Transfer Research; 2 years; $8,000

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL, Washington, D.C.; Office of Documentation; 1 year; $36,920

Publication of Biological and Ecological Study of Kats on Pacific Islands; 1 year; $5,000

Study of Scientific Information and Communication; 1 year; $26,134

Publication of the Journal, "International Geology Review," 1 year; $65,825

Support of Office of Documentation; 1 year; $41,400

Translation of the "Doklady Geology Series—1959 Volume II." 1 year; $33,130


NATIONAL BUREAU OF STANDARDS, Washington, D.C.; Research Information Center and Advisory Service on Information Processing; 1 year; $50,000

NATIONAL DRIFT LIBRARY, Tokyo, Japan; Translation and Printing of Quarterly "Index Periodical Articles, Natural Sciences Section, English," 1 year; $49,000

NATIONAL FEDERATION OF SCIENCE ABSTRACTING AND INDEXING SERVICES, Philadelphia, Pa.; Visit to the Soviet All-Union Institute of Scientific and Technical Information; 1 month; $1,382

NEW YORK BOTANICAL GARDEN, New York, N.Y.; Pilot Study of Application of Electronic Data Processing Devices to Systematic and Economic Botany; 4 months; $4,700

UNIVERSITY OF NOTRE DAME, Notre Dame, Ind.; Preparation and Publication of "Bibliography of Hydrometry." 1 year; $25,000

UNIVERSITY OF OKLAHOMA RESEARCH INSTITUTE, Norman, Okla.; Preparation and Publication of "An Anthropological Bibliography of the Eastern Seaboard," Volume II; 2 years; $12,800

OLOF LARRELL, Portland, Oreg.; Completion of the Manuscript of a Monograph "The Cerebrum From Mammals to Man," 1 year; $1,500

OPERATIONS RESEARCH SOCIETY OF AMERICA, Cambridge, Mass.; Preparation of an Annotated Bibliography on Operations Research 1955-60; 2 years; $55,300


OREGON STATE COLLEGE, Corvallis, Oreg.; Preparation for Publication of Revised Edition of "A Manual of the Higher Plants of Oregon," 1 year; $3,000

ORGANIC ELECTRONIC SPECTRAL DATA, INC., Berkeley, Calif.; Preparation for Publication of Organic Electronic Spectral Data 1946-60 (Volume III); 1 year; $4,000

ORGANIZATION OF AMERICAN STATES, Washington, D.C.; A Cooperative Study of the Resources, Services and Potential for Expansion of Documentation Centers of Latin America; 2 months; $1,382

PENNSYLVANIA STATE UNIVERSITY, University Park, Pa.; Compilation and Publication of an Illustrated "Catalog of Fossil Spores and Pollen;" 1 year; $21,800

Publication of "Underwater Acoustics Handbooks," 1 year; $7,300

ROSCOE B. JACKSON MEMORIAL LABORATORY, Bar Harbor, Maine; Continued Support for a Subject-Strain Bibliography and a Gene
Bibliography of the Mouse; 2 years; $9,200

SAINT LOUIS UNIVERSITY, Saint Louis, Mo.; Compilation of Part IV of the "Bibliography on the Genetics of Drosophila"; 4 years; $3,750

SCIENCE SERVICE, Washington, D.C.; Editing, Printing, and Mailing a 16-Page Supplement to the Science News Letter on Mainland Chinese Science; 3 months; $4,236

SMITHSONIAN INSTITUTION, Washington, D.C.; Classification and Multiplicity of Growth Layers in the Branches of Trees; 1 year; $4,500

Operating Expenses of the Biosciences Information Exchange; 1 year; $45,000

Partial Support for the Mechanization of the Biosciences Information Exchange; 1 year; $40,000

SOCIAL SCIENCE RESEARCH COUNCIL, New York, N.Y.; Project to Enable the Joint Committee on Contemporary China of the American Council of Learned Societies and the Social Science Research Council to Assist U.S. Research Libraries to Obtain Those Materials Relating to Mainland China Which Are Currently Being Produced by the U.S. Joint Publications Research Service; 2 years; $15,000

University of Southern California, Los Angeles, Calif.; Preparation of Bibliography of the Geology and Mineral Resources of California, 1937 to 1959; 1 year; $11,500

SPECIAL LIBRARIES ASSOCIATION, New York, N.Y.; Continued Support for the Operation of the Scientific Translation Center; 1 year; $24,000

Survey of Translation Activities in Technology; 1 year; $54,105

STANFORD UNIVERSITY PRESS, Stanford, Calif.; Preparation for Publication of a Revised, English Edition of "Hydrodynamics of Lubrication" by N. Tipei; 1 year; $15,400

Translation of "Hydroaerodynamics of Lubrication," by N. Tipei from Romanian to English; 1 year; $3,023

STANFORD UNIVERSITY, Stanford, Calif.; Proposed Translation and Publication of Dr. E. M. Savitsky's Book Entitled "The Influence of Temperature on the Mechanical Properties of Metals and Alloys"; 6 months; $5,900

TEXAS RESEARCH FOUNDATION, Ranger, Tex.; Publication of Part VI (the Sallanches and Index) of Volume 3 of "Flora of Texas"; 1 year; $2,800

UNIVERSITY OF TOLEDO, Toledo, Ohio; Completion of the Manuscript for a New Edition of "The Physical Chemistry of the Solids"; 2 years; $11,000

U.S. DEPARTMENT OF AGRICULTURE, Washington, D.C.; A Study of the Availability and Utilization of Oriental Scientific Publications in the USDA Library; 2 years; $25,000

U.S. DEPARTMENT OF COMMERCE, Washington, D.C.; Dissemination of Government Scientific Reports; 1 year; $85,000

Reproduction and Distribution of Air Information Division (AID) Abstracts; 6 months; $38,762

U.S. DEPARTMENT OF STATE, Washington, D.C.; Employment of a Polish National at the United States Embassy in Warsaw, Poland; 8 months; $460

U.S. JOINT PUBLICATIONS RESEARCH SERVICE, New York, N.Y.; Translation of "Referatsny Zhurnal Biologii"; 1 month; $38,374

WASHINGTON STATE UNIVERSITY, Pullman, Wash.; Publication of a Monograph on the Genus Tilletia; 1 year; $5,400

UNIVERSITY OF WASHINGTON, Seattle, Wash.; A Chinese-English Mechanical Translation Project for Research in the Lexicographical and Structural Problems of the Chinese Language; 1 year; $33,700

WENZ STATE UNIVERSITY, Detroit, Mich.; Partial Support of a Working Conference on Mechanical Translation During July 1960, at Princeton, New Jersey; 4 days; $5,000

WESTERN RESERVE UNIVERSITY, Cleveland, Ohio; Test Program To Evaluate Notation Systems for Chemical Structural Formulas; 1 year; $5,000

Test Program for Evaluating Procedures for the Exploitation of Literature of Interest to Metallurgists; 1 year; $159,200

UNIVERSITY OF WISCONSIN, Madison, Wis.; Translation and Foreign Scientific Center in the Fields of Geophysics, Glaciology and Geology (Polar Research); 2 years; $42,936

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## APPENDIX E

### Fellowship Awards Offered

**National Science Foundation Fellowship Awards, by Type and Field, Fiscal Year 1960**

<table>
<thead>
<tr>
<th>Field</th>
<th>Graduate</th>
<th>Cooperative</th>
<th>Graduate teaching assistants</th>
<th>Post-doctoral regular</th>
<th>Post-doctoral senior</th>
<th>Science faculty</th>
<th>Secondary teachers</th>
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<td><strong>254</strong></td>
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<td><strong>62</strong></td>
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<td><strong>1,190</strong></td>
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<td><strong>180</strong></td>
<td><strong>75</strong></td>
<td><strong>288</strong></td>
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### Names, Residences, and Fields of Study of Individuals Offered National Science Foundation Fellowships

**ALABAMA**

**Graduate**
- BURBEE, EDWARD M., Birmingham, Chemistry.
- COULTER, CLAUDE A., Phoenix City, Physics.
- GUNTER, THOMAS E., Tallahassee, Physics.
- HOLLIS, CHARLES H., Lafayette, Engineering.
- JONES, LAWRENCE H., Mobile, Biochemistry.
- MACNAMARA, JOHN F., Mobile, Zoology.
- MAGUIRE, JOHN A., II, Birmingham, Chemistry.
- MILLER, EDWARD J., Mobile, Zoology.
- MORAN, MARTIN T., Mobile, Physics.
- SANDERS, JACK T., Birmingham, Physics.

**Cooperative Graduate**
- ALLEN, LEO H., Jr., Opelika, Agriculture.
- BENTLEY, WILLIAM H., Huntsville, Engineering.

**Postdoctoral**
- COGGINS, JAMES L., Brundidge, Engineering.
- COOPER, GARY P., Springfield, Medical Sciences.
- COULTER, PHILIP W., Phenix City, Physics.
- CUTCHEN, JOHN T., Dothan, Physics.
- FLOYD, THOMAS D., Birmingham, Engineering.
- GABRETT, WILLIAM R., Birmingham, Physics.
- MCKENZIE, H. W., Jr., Anniston, Chemistry.
- MULLINS, PROGY J., Huntsville, Mathematics.
- PROFT, FRANKLIN M., Anniston, Physics.
- SMITH, CLOYT V., Jr., Sylacauga, Engineering.

**Science Faculty**
- PARKER, JEAN T., Florence, Mathematics.
- WITTEN, KENNETH W., Dawson, Chemistry.
ARKANSAS

Graduate

ARNO LD, RICHARD C., Fayetteville, Physics.
CHRISTIE, JORI H., Magnolia, Chemistry.
HILL, JOHN W., Fayetteville, Chemistry.
RUSSELL, CHARLES D., El Dorado, Chemistry.

Cooperative Graduate

ATTERBE R, PHILIP R., Van Buren, Physics.
CHILD, WILLIAM V., Magnolia, Chemistry.
D M ICHE VSKY, BASIL, Fayetteville, Chemistry.
HALP RN, LYND S., Fayetteville, Genetics.
ISNIG, FREDERICK A., Little Rock, Psychology.
WE AY, HILL Y M., Magnolia, Psychology.
WEA R, JAMES O., Fayetteville, Chemistry.

Science Faculty

IMHOFF, JOHN L., Fayetteville, Mathematics.
RADLEY, EDWARD T., Conway, Chemistry.
WEBB, BRYAN J., Fayetteville, Engineering.

Summer Fellowships for Secondary School Teachers

BLASKOVICS, KAY H., Stuttgart, Mathematics.

SUMMER FELLOWshiPS FOR SECONDARY SCHOOL TEACHERS

SMITH, JAMES H., North Little Rock, Botany.
BROOKS, DAISY LABURN, Junction City, Mathematics.
DOBSON, JACK T., Lonoke, Biology.
GARNER, BERNICE L., Norphlet, Biology.
JORDAN, CHESTER L., Fort Smith, General Science.
NEWTON, MCKINLEY, Tuckerman, General Science.
PUATLX, IDA M., Prescott, Biology.

CALIFORNIA

Graduate

ABERS, ERNEST S., San Francisco, Physics.
AITKEN, DONALD W., Jr., Palo Alto, Physics.
ALBINI, FRANK A., Altadena, Engineering.
ALBRIGHT, NORMAN W., Pasadena, Physics.
ANDERSON, DONALD W., Van Nuys, Mathematics.
ARQUIS, CLIFFORD W., Playa Del Rey, Mathematics.

Postdoctoral

ARQUIS, CLIFFORD W., Playa Del Rey, Mathematics.

Science Faculty

HOBSON, ROBERT W., San Francisco, Zoology.
SCHROEDER, THOMAS W., San Francisco, Zoology.
WALKER, EVERETT L., Los Angeles, Geology.
TUCKER, IDA M., San Francisco, Zoology.

SUMMER FELLOWSHIPS FOR GRADUATE TEACHING ASSISTANTS

MORRIS, LAURENCE, San Diego, Zoology.
MOORE, ELDREDGE M., Minneapolis, Earth Sciences.
O'CONNELL, CONSTANCE J., San Francisco, Zoology.
PEAKS, EDMUND J., Jr., Phoenix, Mathematics.
ROTH, RICHARD L., Tucson, Mathematics.
WAIT, JOHN V., Tucson, Engineering.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

DAY, ROGER H., Phoenix, Zoology.
SHOWLEY, DEVON LEE, Scottsdale, Physics.
TOOLEY, JACOB V., Phoenix, Biology.

ARKANSAS

Graduate

ARNOLD, RICHARD C., Fayetteville, Physics.
CHRISTIE, JOE H., Magnolia, Chemistry.
HILL, JOHN W., Fayetteville, Chemistry.
RUSSELL, CHARLES D., El Dorado, Chemistry.

Cooperative Graduate

ATTERBERRY, PHILIP R., Van Buren, Physics.
CHILD, WILLIAM V., Magnolia, Chemistry.
DMICHEVSKY, BASIL, Fayetteville, Chemistry.
HALPRIN, LYDIA S., Fayetteville, Genetics.
ISNIG, FREDERICK A., Little Rock, Psychology.
WEAVER, HILLY M., Magnolia, Psychology.
WEAR, JAMES O., Fayetteville, Chemistry.

Science Faculty

IMHOFF, JOHN L., Fayetteville, Mathematics.
RADLEY, EDWARD T., Conway, Chemistry.
WEBB, BRYAN J., Fayetteville, Engineering.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

BLASKOVICS, KAY H., Stuttgart, Mathematics.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

MONROE, JAMES E., Prescott, Zoology.
VAZQUEZ, POLLY E., Tucson, Astronomy.
WALTER, EVERETT L., Mesa, Mathematics.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

DAY, ROGER H., Phoenix, Zoology.
SHOWLEY, DEVON LEE, Scottsdale, Physics.
TOOLEY, JACOB V., Phoenix, Biology.
Burnett, Donald S., Berkeley, Chemistry.
Chong, Delano P., San Francisco, Chemistry.
Clark, Alan R., San Jose, Physics.
Cohen, Julia H., Menlo Park, Zoology.
Chickeon, James H., Berkeley, Physics.
Dassen, Roger F., Redding, Physics.
Daybell, Melvin D., Pasadena, Physics.
Dobey, Ray M., Cupertino, Physics.
Douglas, Roger L., Albany, Physics.
Draut, Alex J., Berkeley, Physics.
Duke, Michael B., Los Angeles, Earth Sciences.
Enderton, Herbert B., San Jose, Mathematics.
Enright, James T., San Diego, Zoology.
Enskine, Melville C., Jr., San Jose, Earth Sciences.
Evensen, David A., Pasadena, Engineering.
Fisk, Robert A., Los Altos, Chemistry.
Gage, Donald H., Durham, Engineering.
Gibson, Edward G., Pasadena, Engineering.
Gillespie, Barbara C., Los Altos, Botany.
Goddard, William A., Los Angeles, Engineering.
Grady, M. Ronald L., Berkeley, Mathematics.
Griffiths, Robert B., Stanford, Physics.
Grimes, Charles C., Berkeley, Physics.
Griswold, Ralph E., Palo Alto, Engineering.
Greeble, Jan A., Inglewood, Physics.
Guncel, Thomas L. II, Pomona, Engineering.
Hagadorn, Irvine R., Albany, Zoology.
Hales, Alfred W., Pasadena, Mathematics.
Harden, Martha J., Palo Alto, Anthropology.
Harrington, David M., Los Angeles, Mathematics.
Hassler, Frances J., Los Angeles, Anthropology.
Hayes, Donald A., Belmont, Physics.
Hearst, John E., Pasadena, Chemistry.
Heilbron, John L., Berkeley, Social Sciences.
Hendricks, Terae J., Berkeley, Physics.
Hermann, Robert W., Berkeley, Engineer.
Hulgeren, Glen O., Berkeley, Chemistry.
Hundley, Richard O., San Gabriel, Physics.
Irvin, William M., Beverly Hills, Physics.
Janssens, Thomas J., Santa Clara, Physics.
Johnson, Dean M., Pasadena, Earth Sciences.
Johnson, Harmon W., Santa Clara, Engineering.
Jorgensen, Norman E., Oakland, Physics.
Keesing, Roger M., Stanford, Anthropology.
Knightley, Willard O., Pasadena, Engineering.
Kent, William L., San Diego, Mathematics.
Kingsley, Jack L., Antioch, Genetics.
Kirke, William L., Jr., Los Angeles, Psychology.
Klott, Eugene A., Costa Mesa, Mathematics.
Kohl, Elizabeth N., Arcadia, Chemistry.
Kondr, Michael W., Berkeley, Biophysics.
Knarr, Franklin R., San Mateo, Psychology.
Kruze, Robert L., Upperland, Mathematics.
Lamarche, Valmore C., Jr., Berkeley, Earth Sciences.
Landgreen, John A., San Francisco, Chemistry.
Landgreen, Arno, National City, Engineering.
Lazin, William E., Wicovina, Engineering.
Lebovitz, Norman R., Van Nuys, Physics.
Leizer, Philip, Orlinda, Zoology.
Levine, Ira N., Van Nuys, Chemistry.
Lewis, Francis H., Menlo Park, Physics.
Libern, William J., Berkeley, Genetics.
Lindsay, Sandra L., Walnut Creek, Genetics.
Lindquist, Evert E., Berkeley, Zoology.
Linson, Lewis M., Oakland, Physics.
Macleod, Fred E., Riverside, Chemistry.
Marshall, J. Howard, III, Pasadena, Physics.
Machtet, Mary D., San Carlos, Biophysics.
Matthews, June L., Altadena, Physics.
Mclvor, Tov K., Stanford, Engineering.
McNall, Norman J., Berkeley, Zoology.
McManigal, Paul G. M., South Pasadena, Physics.
Mihalas, Dimitri M., Los Angeles, Astronomy.
Mock, William L., South Pasadena, Chemistry.
Moffet, Leroy J. P., Claremont, Earth Sciences.
Muirbrock, Newell K., Ogden, Engineering.
Munson, John H., Burbank, Physics.
Murray, Bettie E., Fontana, Biochemistry.
Nearing, James C., Hawthorne, Physics.
Neighbor, James E., Walnut Creek, Physics.
Nelson, Keith B., Berkeley, Zoology.
Nelson, Wayne B., Pasadena, Physics.
Neville, Donald E., Los Angeles, Physics.
Ng, Judith, Oakland, Mathematics.
Oglesby, Larry C., Atascadero, Zoology.
Palmer, Leigh H., Sacramento, Physics.
Paolillo, Dominick J., Jr., Davis, Botany.
Parke, Peter D. M., Monterey Park, Physics.
Paulikas, George A., Berkeley, Physics.
Pearson, Gerald A., Redondo Beach, Chemistry.
Peck, Charles W., Pasadena, Physics.
Penland, Richard M., Gridley, Chemistry.
Pierce, William H., Los Altos, Engineering.
Pitts, R. Ivan M., Berkeley, Chemistry.
Rabinowitz, Lawrence, Berkeley, Medical Sciences.
Ralls, Kenneth M., Stanford, Engineering.
Rapaport, Seymour A., Los Angeles, Medical Sciences.
Rapier, Jerry L., Baldwin Park, Physics.
Renato, Leon R., San Mateo, Engineering.
Rothkopf, Michael H., Beverly Hills, Social Sciences.
Royce, Edwin B., Pasadena, Physics.
Schultz, Claude H., Davis, Physics.
Schweitzer, Glenn E., Los Angeles, Engineering.
Seale, Richard B., Berkeley, Botany.
Shibles, George A., Corte Madera, Physics.
Simpson, Paul G., Wilmington, Chemistry.
Sinoff, William A., Los Angeles, Engineering.
Smith, David E., Alhambra, Social Sciences.
Smith, Earnest E., Sepulveda, Physics.
Snively, Frank T., Pasadena, Physics.
CALIFORNIA—Continued

SOULES, GEORGE W., Jr., Van Nuys, Mathematics.
SPARKS, MARSHALL S., Jr., Berkeley, Physics.
STREET, ROBERT L., San Diego, Engineering.
SWENNEY, DARYL C., El Corrito, Zoology.
THIEBAUX, MARTIAL L., Jr., Whittier, Physics.
THOR, DALE W., Sunnyside, Mathematics.
THOMASSEN, KEITH L., Stanford, Engineering.
THORNTON, MELVIN C., San Diego, Mathematics.
TRAFFON, LAURENCE M., Los Angeles, San Diego, Astronomy.
VALERGA, ANTONIO J., Oakland, Chemistry.
VIDAYEN, WILLIAM E., San Mateo, Botany.
VILLAS, GEORGE C., Pasadena, Engineering.
WAGNER, TERRY J., Albany, Engineering.
WATERS, JAMES F., Santa Barbara, Zoology.
WEILL, DANIEL F., Berkeley, Earth Sciences.
WELSEY, JOSEPH M., Oakland, Mathematics.
WHEELER, HOWARD L., Los Angeles, Physics.
WESTHAMMER, NATHAN R., Berkeley, Physics.
WIGLEY, NEIL M., Albany, Mathematics.
WILSEY, ELEANOR W., Palo Alto, Psychology.
WILLIAMSON, ROBERT E., Jr., Berkeley, Mathematics.
WILLIS, EDWIN O., Berkeley, Zoology.
WILSON, DONALD R., Los Angeles, Chemistry.
WOLLMIE, BRADBARD D., Los Angeles, Mathematics.
WRIGHT, JOHN M., Pasadena, Chemistry.
YOUNG, LAUREL M., Mentone, Mathematics.

Cooperative Graduate

AHLENS, GUSTEN, Berkeley, Chemistry.
ALLEN, WILLIAM V., Palo Alto, Biology.
BAILEY, ALFRED J., Redwood City, Engineering.
BALL, GEOFFREY H., Bell, Engineering.
BARBER, MARY L, Los Angeles, Biochemistry.
BECK, MYRL E., Jr., Beaumont, Earth Sciences.
BEITKEN, DANIEL A., Los Angeles, Zoology.
BELLA, L., Los Angeles, Physics.
BLAKELY, LAWRENCE M., San Marcos, Botany.
BOHN, ROBERT K., Seabrook, California.
BOND, FREDERICK T., Berkeley, Chemistry.
BOWMAN, THOMAS E., Burlingame, Engineering.
BOWSER, CARL J., Pomona, Earth Sciences.
BOYCE, RICHARD F., Spring Valley, Social Sciences.
BROWN, MELANCHON S., Palo Alto, Chemistry.
BURCHFIEL, BURRELL C., Long Beach, Earth Sciences.
CAULEY, ROBERT C., Los Angeles, Psychology.
CARLILE, JACK W., Berkeley, Engineering.
CARTER, NEVILLE L., Culver City, Earth Sciences.
CAULEY, JOSEPH P., Pasadena, Physics.
CHAPPLE, WILLIAM M., La Jolla, Earth Sciences.
COCCERIA, MICHAEL, Los Angeles, Chemistry.
DAMPFORTH, CHARLES G., Glendale, Medical Sciences.
DAVIS, GREGORY A., Berkeley, Earth Sciences.
DEJARN, GABY W., Altadena, Engineering.
FELDMAN, MARTIN R., Los Angeles, Chemistry.
FLIGARE, WILLIAM H., Berkeley, Chemistry.
FLEITZ, ALBERT E., Los Angeles, Earth Sciences.
GIACOLI, DOUGLAS C., Berkeley, Physics.
GULSERIKER, HAROLD J., Berkeley, Earth Sciences.
GROSS, FLETCHER L., La Canada, Mathematics.
HAINLINE, LYDIA J., San Bernardino, Anthropology.
HAMILTON, GORDON W., Berkeley, Physics.
HARTMANN, RICHARD W., Santa Monica, Agriculture.
HERZBERG, ALAN J., Berkeley, Physics.
HEINRICHS, DONALD F., Bakersfield, Earth Sciences.
HILLER, FREDERICK S., Palo Alto, Engineering.
HOLLOWAY, CHARLES M., Los Angeles, Mathematics.
KAHN, PAUL M., Fairfax, Mathematics.
KEISLER, H. JEROME, Pasadena, Mathematics.
KENDNn, ROBERT F., La Canada, Engineering.
KERR, WILLIAM M., Jr., Claremont, Botany.
KOC, KAY J., Berkeley, Chemistry.
LANE, CHARLES A., Berkeley, Chemistry.
LANG, SIDNEY B., San Francisco, Engineering.
LEANDAR, GEORGE G., Albany, Engineering.
LOCKARD, ROBERT B., Bakersfield, Psychology.
MAGEE, PATRICK M., Los Angeles, Engineering.
MANDELL, RICHARD L., Rosemead, Engineering.
MULLIGAN, JAMES A., Oakland, Zoology.
NAZAROFF, GEORGE V., San Francisco, Chemistry.
NUDELLE, ROBERT J., Berkeley, Chemistry.
PARKES, ROBERT A., Monterey Park, Astronomy.
PATTERSON, JOHN D., Santa Rosa, Engineering.
PENNE, JACQUES J., Los Angeles, Genetics.
PRICE, KENDALL C., San Francisco, Psychology.
RAND, JOAN E., Santa Barbara, Mathematics.
RIGGS, ARTHUR D., San Bernardino, Biochemistry.
ROBINSON, LOS ANGELES, Mathematics.
ROE, ARNOLD, Los Angeles, Engineering.
ROELOF, EDMUND C., Granada Hills, Physics.
RONY, PETER R., Los Angeles, Engineering.
SCHLEUSER, EDWIN C., Encino, Physics.
SHAIN, STEVEN A., Albany, Engineering.
SHIER, JOHN S., Pasadena, Physics.
SIMMONS, JERRY L., Rosemead, Engineering.
Wagner, William G., South Pasadena, Physics.
Weng, Robert J., Empire, Mathematics.
Werner, Newton D., Los Angeles, Chemistry.
Wyman, Melvin J., Los Angeles, Psychology.

Postdoctoral

Bennhoff, James A., Quincy, Anthropology.
Bonic, Robert A., Los Angeles, Mathematics.
Cantor, David G., Van Nuys, Mathematics.
Carterette, Edward C., Studio City, Physics.
Chan, Sunn Y., San Francisco, Physics.
Crawley, Peter L., Alhambra, Mathematics.
Crawley, Gerald K., Palo Alto, Earth Sciences.
Emery, Thomas F., San Anselmo, Biochemistry.
Feldman, Jacob, Berkeley, Mathematics.
Garriott, Owen K., Mountain View, Physics.
Gehlardi, Raymond J., La Jolla, Zoology.
Goldenberg, Harold M., Los Angeles, Physics.
Goldinough, John P., Stanford, Physics.
Hanna, Melvin W., Pasadena, Chemistry.
Hill, Elgin A. III, Pasadena, Chemistry.
Jordan, Peter C., Los Angeles, Chemistry.
Lag, Francis Y., Hayward, Medical Sciences.
Lubliner, Jacob, Los Angeles, Engineering.
Lyber, Katherine M., Lafayette, Zoology.
McConkey, Edwin H., Berkeley, Biochemistry.
Mechanic, Arnold, Berkeley, Psychology.
Michel, Francis W., Palo Alto, Medical Sciences.
Picking, Ranard J., Mountain View, Earth Sciences.
Raven, Peter H., Los Angeles, Botany.
Robowski, Andrew, Beverly Hills, Chemistry.
Vogel, Martin, Los Angeles, Chemistry.
Wilde, Douglas J., Berkeley, Engineering.
Zwanziger, Daniel E., San Diego, Physics.

Senior Postdoctoral

Crowell, John C., Los Angeles, Earth Sciences.
Fowler, Charles A., Jr., Claremont, Physics.
Fretter, William B., Berkeley, Chemistry.
Karlin, Samuel, Stanford, Mathematics.
Knopoff, Leon, Los Angeles, Earth Sciences.
Oppenheim, Antoni K., Berkeley, Engineering.
Stent, Gunther S., Berkeley, Biophysics.

Science Faculty

Allen, C. Freeman, Claremont, Biochemistry.
Armin, L. Clair, Reedley, Zoology.
Bourne, Henry C., Jr., Berkeley, Engineering.
Botes, William E., Upland, Physics.
Burt, Robert H., Davis, Engineering.
Burdell, Bertram, Los Angeles, Engineering.

Cooper, Grant S., Walnut, Chemistry.
Davis, Ward B., Whittier, biochemistry.
Dowd, Allan C., San Diego, Zoology.
Fischer, Robert D., Glendale, Physics.
Hartesveldt, Richard J., San Jose, Agriculture.
Hilman, Jack C., El Camino College, Chemistry.
Hunkeler, Rodney W., Chico, Astronomy.
Krauskopf, Konrad B., Stanford, Chemistry.
Newkirk, Gail A., Lancaster, Zoology.
Parker, Edward C., Jr., Arcata, Physics.
Pipkin, Bernard W., El Camino College, Earth Sciences.
Rattiner, Diben, San Mateo, Medical Sciences.
Rendel, Robert J., Monterey, Earth Sciences.
Venuti, William J., San Jose, Engineering.
Voss, Sr., Anna, Belmont, Biology.
Willing, Warren C., Chango Park, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

Anderson, John P., Jr., Los Angeles, Physics.
Buss, Stanley S., Los Angeles, Earth Sciences.
Blanks, Robert F., Berkeley, Engineering.
Borton, Gilbert W., Temple City, Chemistry.
Cazner, Neville L., Culver City, Earth Sciences.
Clarke, William C., Berkeley, Earth Sciences.
Collon, Joseph M., San Diego, Engineering.
Dodg, Hamy W., Jr., Los Angeles, Earth Sciences.
Eisenberg, Everett T., Stockton, Engineering.
Hamburger, Kimball L., Berkeley, Engineering.
Holmes, Robert E., Castro Valley, Chemistry.
Junker, Hans H., Oakland, Engineering.
Kendall, Arnold G., Los Angeles, Zoology.
Kohles, Joseph, Pasadena, Mathematics.
Kreps, Theodora C., Palo Alto, Anthropology.
Laatsch, Watson M., Stanford, Botany.
Lebede, Hans H., Los Altos, Anthropology.
Lindquist, Evelyn E., Berkeley, Zoology.
Lloyd, James R., Cucamonga, Engineering.
Lumpkin, Oscar J., Los Angeles, Physics.
Lyttin, Jack L., Berkeley, Engineering.
McKee, Edwin H., Berkeley, Zoology.
Mier, Millard G., Los Angeles, Physics.
Mulligan, James A., Oakland, Zoology.
Neller, David, Berkeley, Social Sciences.
Neuman, Robert C., Jr., Whittier, Chemstry.
Ng, Judith, Oakland, Mathematics.
Pagnott, Weldon M. II, Berkeley, Chemistry.
Pene, Jacques J., Los Angeles, Genetics.
Price, Kendall O., San Francisco, Psychology.
Richmond, Ruth J., Los Angeles, microbiology.
Rumney, Howard C., Jr., Alhambra, Mathematics.
CALIFORNIA—Continued

RUffet, richard w., Pasadena, Social Sciences.
SCHULTE, CLAUDE E., Davis, Physics.
SHEEHAMMER, Howard s., woodland, Zoology.
SIGEL, MURRAY J., Stanford, Chemistry.
SIEGEL, JAMES T., Berkeley, Anthropology.
SPIELMAN, SYMOUR, Los Angeles, Mathematics.
STANLEY, WILLIAM R., Fresno, Engineering.
STIRIO, THOMAS G., Los Angeles, Chemistry.
STERNLICHT, HAM, Pasadena, Chemistry.
TAYLOR, CHARLES M., Pasadena, Earth Sciences.
THICKER, VANU A., Los Angeles, Zoology.
VORMBERGER, Newton d., Los Angeles, Chemistry.
WERTHEIM, GEORGE A., Menlo Park, Psychology.
WITKOVSKY, PAUL, Los Angeles, Zoology.
WYNN, THEODORE J., Jr., Modesto, Chemistry.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

ANBON, HERBERT F., Ventura, Mathematics.
BERNOW, ROBERT DAVID, walnut, Zoology.
BLOSSER, JOHN E., San Diego, General Sciences.
BROMMER, ROGER B., Oakland, General Sciences.
BRENNAN, Sr., M. ELAINE, San Rafael, General Sciences.
BRYANT, HARRY DELVIN, Davis, Zoology.
CLARK, BURNICE V., Bakersfield, Mathematics.
COMINS, Sr., M. VICTORIA, San Francisco, Biochemistry.
DAVID, IRA A., Brea, General Sciences.
ENTART, JESSIE JAMES, Dorris, Mathematics.
FASSELL, GEORGE N., Culver City, Botany.
PENNMAN, Bernard, Canoga Park, Mathematics.
Gaffeney, st., ELEANOR M., Belmont, Zoology.
Gunnstrem, stanley e., Pasadena, Biology.
HAINLINE, VIN KIRK, San Bernardino, Biology.
HARDEN, WILLARD W., El Segundo, Zoology.
HEGII, RONALD R., Redding, Mathematics.
HERMANN, KENNETH R., Bakersfield, Mathematics.
HAYT, HERMAN R., Los Angeles, Mathematics.
JOHNSON, VIRGINIA MAE, Monterey, Mathematics.
KARLIN, SOL ALLEN, Reseda, Botany.
KINNE, JACk RUDOLP, Van Nuys, Mathematics.
KILPATRICK, JEREMY, Berkeley, Mathematics.
LAURENNIA, LOUIS G., San Diego, Biology.
MAGNUSSON, LLOYD N., La MIRADA, Chemistry.
NELSON, CARL C., Sanger, Biology.
PARKER, JOHN O., Palo Alto, Mathematics.
RASHFORD, Sr., M. ROSE D., Oakland, Mathematics.
SARCEY, BERNARD E., San Bernardino, Zoology.
SIEBERG, MERLE M., Fresno, Mathematics.
TREITMAN, STANLEY S., Colton, General Sciences.
WARD, HARRY JOHNSON, Bakersfield, Mathematics.

WILSON, CHARLES ORIN, Manhattan Beach, Zoology.
WOODHEAD, ROBERT JAMES, Sutter, General Sciences.

COLORADO

GRADUATE

CORNWALL, JOHN M., Denver, Physics.
HUTSON, RICHARD L., Boulder, Earth Sciences.
IRWIN, HENRY J., Denver, Anthropology.
MCKINNIS, RALPH W., Boulder, Mathematics.
NEPPEL, DONALD A., Monte Vista, Physics.
O'CONNOR, JOSEPH T., Boulder, Earth Sciences.
PICKEN, JAMES S., Loveland, Engineering.
SHEPHERD, JOHN V., Grand Junction, Earth Sciences.
STONE, GEORGE T., Cowdrey, Earth Sciences.
WEBB, GEORGE D., Denver, Medical Sciences.
WILSON, ALLEN M., Colorado Springs, Agriculture.

COOPERATIVE GRADUATE

BIRK, CARL W., Jr., Fort Collins, Genetics.
ELSTY, Sr., MARGARET G., Loretto, Mathematics.

GILLESPIE, JOHN R., Denver, Physics.
KOMMA, DONALD J., North Park, Genetics.
OHL, ARDEN W., Greeley, Social Sciences.
SHAW, MARION L., Colorado Springs, Physics.
SHOTWELL, DAVID A., Boulder, Mathematics.
WILCOX, RALPH M., Boulder, Physics.

POSTDOCTORAL

NATHANSON, STANLEY G., Denver, Medical Sciences.

SCIENCE FACULTY

FECHNER, GILBERT H., Fort Collins, Genetics.
GATELEY, WILSON Y., Boulder, Mathematics.
JOHNSON, DONALD L., Canoga Park, Engineering.
MURPHY, BETH, Canyon City, Medical Sciences.

GRADUATE TEACHING ASSISTANTS

BECKETT, ROBERT L., Golden, Earth Sciences.
BUSH, PATRICIA E., Longmont, Mathematics.
CONNOR, JON J., Boulder, Earth Sciences.
LOTT, LAYMAN A., Fort Collins, Physics.
ROSE, GEORGE T., Cowdrey, Earth Sciences.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

BAKER, CLAUDE KENNETH, Englewood, General Sciences.
BLUMGARD, HAROLD E., Aurora, Chemistry.
JEFFREY, JAMES A., Denver, Mathematics.
MORRISON, ROBERT G., Denver, Physics.
STERN, MARSHALL T., Meeker, Earth Sciences.

CONNECTICUT

GRADUATE

BALDWIN, DAVID E., West Hartford, Physics.
BRISTOL, MELVIN L., Collinsville, Genetics.
CRAMPTON, STUART B., Greenwich, Physics.
DOLLARD, JOHN D., Hamden, Physics.
FISHER, GEORGE W., Hamden, Earth Sciences.
FLISCHER, EVERLY B., Branford, Chemistry.
FLYNN, GEORGE W., Jr., Hartford, Chemistry.
FOOTE, CHRISTOPHER S., West Hartford, Chemistry.
GUTHRIE, HOWARD L., Jr., Meriden, Social Sciences.
JOHNSON, JOHN E., Ansonia, Zoology.
KLQY, RONALD J., New Britain, Earth Sciences.

MASSO, JOSEPH F., Danlen, Physics.

MARTINEZ, STEVEN W., Danbury, Physics.

MERMIN, JOEL L., New Haven, Mathematics.

MERMIN, N. DAVID, New Haven, Physics.

PEASE, ROGER W., Jr., New Britain, Biology.

PLANE, DONALD L., Rockville, Mathematics.

SIMPSON, JAMES E., New Haven, Mathematics.

STEPHENSOn, ROBERT R., Mount Carmel, Engineering.

TUBURO, NICHOLAS J., Jr., Middletown, Chemistry.

YOUNG, DAVIDA M., Wilton, Psychology.

Cooperative Graduate

AVERY, DONALD H., West Hartford, Earth Sciences.

BARKER, KLAUS H., Stratford, Physics.

BARR, RICHARD G., Bristol, Physics.

CHAMBERS, DONALD S., Colchester, Zoology.

DIMMOCK, JOHN O., Branford, Physics.

DOOLITTE, RUSSELL F., North Haven, Religion.

HIREH, HAROLD F., Rockville, Zoology.

KOWALSKl, ALANDEB J., Norwich, Engineering.

PABICK, RICHARD R., West Wlllimgtou, Earth Sciences.

PLANK, DONALD L., Rockville, Mathematics.

SIMPSON, JAMES E., New Haven, Mathematics.

STIPHINSON, ROBERT R., Mount Carmel, Engineering.

TOTH, LOUIS E., Easton, Engineering.

Postdoctoral

BRIGGS, THOMAS, South Norwalk, Biochemistry.

BRUNER, EDWARD M., New Haven, Anthropology.

GROSS, LEONARD, New Haven, Mathematics.

HAGAN, ABHAG B., New Haven, Mathematics.

MEIGS, ROBERT A., Newington, Medical Sciences.

RIFFF, JOHN D., New Haven, Physics.

Science Faculty

HOUSE, LAWRENCE C., Storrs, Mathematics.

SLOWINSKI, EMIL J., Jr., Storrs, Chemistry.

SUMMER FELLOWSHIPS FOR GRADUATE TEACHING ASSISTANTS

CHAMBERS, DONALD S., Colchester, Zoology.

CHRISTENSEN, RICHARD M., New Haven, Engineering.

GRAHAM, JOHN D., New Haven, Chemistry.

LIPMAN, PETER W., Cannondale, Earth Sciences.

MACLAUCHLAN, JAMES A., Jr., New Haven, Physics.

PROVOR, PHILIP J., Bristol, Microbiology.

READ, MARY E., Fairfield, Anthropology.

SIMPSON, TRACY L., New Haven, Zoology.

STANLEY, ROLFE S., Cheshire, Earth Sciences.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS


CAPPER, DAN, Wilton, Botany.

CARLOW, CHESTER D., Branford, Mathematics.

DI BLASI, SR., ST. ANTH, Stamford, Biology.

GUILBAULT, SR., ST. LUCI1, Stamford, Mathematics.

POWELL, JOHN J., Clinton, General Science.

STONE, GEORGE NORTON, Lakeville, Mathematics.

DELAWARE

Graduate

DAY, BENJAMIN D., Newark, Physics.

GALT, JAMES C., Newark, Engineering.

KING, MERRILL K., Claymont, Engineering.

LORAND, JOHN P., Wilmingtou, Chemistry.

Cooperative Graduate

BOLLINGER, ROBERT E., Newark, Engineering.

Foster, GAIL E., Seafood, Mathematics.

JORDAN, DAVID M., Wilmingtou, Chemistry.

McGROWTH, PAUL A., Wilmingtou, Chemistry.

WEBER, CAROLYN J., New Castle, Zoology.

Yellen, Tobias O., Wilmingtou, Medical Sciences.

Senior Postdoctoral

KwAT, HERALD, Newark, Chemistry.

SUMMER FELLOWSHIPS FOR GRADUATE TEACHING ASSISTANTS

ARCHER, ROBERT A., Wilmingtou, Chemistry.

THORNTON, ROGER L., New Castle, Chemistry.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

MAHAN, RALPH EUGENE, Seafood, Mathematics.

MITCHELL, MO. FRAN DES, Wilmingtou, Biology.

DISTRICT OF COLUMBIA

Graduate

ELIOT, FRANK C., Engineering.

HACKMAN, MORTON M., Mathematics.

HOFFMAN, FREDERICK, Mathematics.

MUCKENTHALER, FLORIAN A., Zoology.

MYERS, GARINH E., Chemistry.

OLIVER, DAVID W., Physics.

QUACKENBUSH, WILLIAM L., Engineering.

KINZER, GEORGE S., Mathematics.

TRUESEBELL, ALFRED H., Earth Sciences.

WILSON, KENT R., Chemistry.

Cooperative Graduate

COURTNEY, JOHN C., Engineering.

DRIN, JAMES T., Physics.

INGLET, JOHN S., Engineering.

JUMONTVILLE, PRESTON C., Psychology.

MARLOR, ADDICKES R., Astronomy.

YOUNG, FRANK C., Physics.

Postdoctoral

RENKIN, BARBARA Z., Medical Sciences.

Senior Postdoctoral

FAUL, HENRY, Earth Sciences.

PIEN, PAO C., Engineering.

RENKIN, EUGENE M., Zoology.

Science Faculty

HENDERSON, RALPH S., Physics.

WHITE, DAVID G., Chemistry.

SUMMER FELLOWSHIPS FOR GRADUATE TEACHING ASSISTANTS

O’NEILL, BERNARD V., Mathematics.

SCOTT, THOMAS M., Engineering.

WALSHE, JOSPEH H., Chemistry.

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DISTRICT OF COLUMBIA—Continued

Summer Fellowships for Secondary School Teachers

FLORIDA

Graduate

BOHON, ANTHONY C., Tallahassee, Zoology.
CORN, JOHN I. III, Tallahassee, Mathematics.
ECHOLS, RONALD J., Naples, Earth Sciences.
FOX, JOSEPH S., Pompano Beach, Chemistry.
FOX, EVELYN, North Miami Beach, Physics.
FLORIDA GRADUATE

BIBB, THOMAS R., Jr., Jensen Beach, History.
BROBB, BETTY PAN, Vero Beach, Biology.
CAMPBELL, ROY F., Ft. Lauderdale, Biology.
EINHORN, GERALD E., Melbourne, Botany.
FABRE, JAMES ALLEN, Panama City, Botany.
HAYGOOD, AUSTIN NIXON, Sarasota, Mathematics.
MAETIN, JOSEPH MANN, Key West, Biology.
MOON, PAUL B., St. Petersburg, Mathematics.
OBERN, ELIELAND M., Summerfield, Biology.
WHITTEN, ETTA MAE, Tallahassee, Mathematics.
WOOLEVER, JOHN D., Sarasota, Biology.
WORTHINGTON, CAROLYN B., Miami, Mathematics.

GEORGIA

Graduate

EICHERG, JOSEPH, Jr., Atlanta, Medical Sciences.
GREEN, MYRON T., Adairsville, Physics.
HOLLEY, EDWARD R., Jr., Atlanta, Engineering.
JOHNSON, CHARLES S., Jr., Albany, Chemistry.
MACINNI, AUSTIN J., Tallahassee, Zoology.
MBACHBIM, ANNE, Daytona Beach, Zoology.
SIBBY, ROSALIE, Atlanta, Mathematics.
SHAEP, HOSS F., Jr., Covington, Zoology.
WILSON, RAYMOND B., Decatur, Chemistry.

Cooperative Graduate

ALVAREZ, LAURENCE H., Valdosta, Mathematics.
ANDERSON, WILSON W., Brunswick, Zoology.
BOUTWELL, GORDON P., Jr., Albany, Engineering.
COVINGTON, DAVE W., Marietta, Mathematics.
GASKINS, HERMAN, Griffin, Zoology.
HOBGOOD, RICHARD T., Jr., Calhoun, Chemistry.
PHILLIPS, ROBERT H., Jr., Rabun Gap, Chemistry.
PHOBES, FRANKLIN P., Atlanta, Chemistry.
ROBERTS, CHARLES D., Atlanta, Mathematics.
SAKER, ROBERT J., Doraville, Mathematics.
SIBLYMOUE, ROSALIE, Atlanta, Mathematics.

Postdoctoral

MURRO, BROWN L., Jr., Atlanta, Chemistry.
O’TOOLE, JAMES T., Columbus, Chemistry.

Science Faculty

BALL, WILFRED R., Athens, Zoology.
FINCHER, JAMES R., Atlanta, Engineering.
JEWITT, JOHN W., Athens, Mathematics.
MOORE, JAMES J., Atlanta, Mathematics.
PURDDY, KENNETH R., Atlanta, Engineering.
YOUSE, BEYAN K., Emory University, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

HELBER, THOMAS R., Jr., Jensen Beach, Zoology.
HERBST, LAURENCE J., North Miami Beach, Mathematics.
HOOKE, RAYMOND E., Tallahassee, Earth Sciences.
LUTZ, RAYMOND P., Jupiter, Chemistry.
MACINNIS, AUSTIN J., Tallahassee, Zoology.
MACHEN, ANNE, Daytona Beach, Zoology.
SMITH, PAULINE C., Jacksonville, Social Sciences.

Summer Fellowships for Secondary School Teachers

ARDON, BRAD MICHAEL, Miami, Biology.
BROERS, HETTY JEAN, Vero Beach, Biology.
CAMPBELL, ROY F., Ft. Lauderdale, Biology.
EINEM, GERALD EUGENE, Melbourne, Biochemistry.
FARMER, JON ALLEN, Panama City, Botany.
HAWAII
Graduate
FURUMOTO, AUGUSTINE S., Honolulu, Earth Sciences.
STORT, ALFRED E., Puunene, Engineering.
Chemistry.
Cooperative Graduate
DEVERILL, ROBERT S., Hilo, Chemistry.
JAY, BARBARA K., Honolulu, Physics.
KITAMURA, MORRIS Y., Honolulu, Physics.
NISHIMURA, JOYCE S., Honolulu, Biochemistry.
TAKASHIMA, HERBERT T., Lahaina Maui.
Science Faculty
DALTON, PATRICK D., Jr., Oahu, Agriculture.
Summer Fellowships for Graduate Teaching Assistants
PLUCKNETT, DONALD L., Honolulu, Agriculture.
IDAHO
Graduate
BUBIDIC, GLENN A., Pocatello, Physics.
MACKEY, JACK W., Mullan, Mathematics.
MURPHY, RICHARD A., Twin Falls, Zoology.
Cooperative Graduate
CONANT, DONALD R., Caldwell, Chemistry.
JONPIE, LEON L., Caldwell, Chemistry.
KBUIOQB, KINNETEI, W., Coeur d'Alene, Botany.
Science Faculty
CROWLEY, WARD, Moscow, Mathematics.
WEEKS, OWEN B., Moscow, Microbiology.
ILLINOIS
Graduate
ALBEBTZI, BBUCE M., Glencoe, Biochemistry.
ANDEES, RONALD P., Elmhurst, Engineering.
ASH, MICHAEL E., Winnetka, Mathematics.
AUST, RICHARD B., Elmhurst, Engineering.
BAKER, PHILIP, Wheaton, Mathematics.
BLISS, JAMEE C., Chicago Heights, Engineering.
BOURQIN, MARCIA V., Evanston, Zoology.
BRENNER, WILLIAM, Jr., Bensenville, Engineering.
KEMPE, SHELDON J., Chicago, Engineering.
KRAWCZYK, GERALD R., Urbana, Mathematics.
KUO, DONALD C., Berwyn, Medical Sciences.
KUO, ROBERT H., Chicago, Medical Sciences.
KUDICK, STANLEY J., Berkeley, Physics.
SACIKET, JAMES R., Northbrook, Anthropology.
SANDER, VERNON R., Evanston, Chemistry.
SCHERTZ, DONALD R., Lowpoint, Engineering.
SHANKS, WESLEY L., Northlake, Physics.
STOKES, DONALD C., Kankakee, Genetics.
SWANK, ROBERT K., Urbana, Physics.
TEBBINO, JOHN J., Chicago, Engineering.
VOLZ, RICHARD A., Woodstock, Engineering.
WILKINS, JOHN W., Rock Island, Earth Sciences.
GOLIN, STUART J., Chicago, Physics.
GLADISH, YVONNE C., Waukegan, Biochemistry.
HUMPHREYS, TOM D. II., Chicago, Zoology.
KEISTER, LEO F., Waukegan, Chemistry.
KRAWCZYK, WILLIAM J., Urbana, Engineering.
KREMER, LEON, W., Chicago, Engineering.
LICHER, CHARLES M., Chicago, Chemistry.
MEAN, KENNETH O., Chicago, Mathematics.
MCALLAN, KEVIN M., Urbana, Mathematics.
MIRKULICKY, DONALD C., Berwyn, Medical Sciences.
MULLIN, MICHAEL M., Mount Carroll, Zoology.
NORTON, KARL K., Urbana, Mathematics.
OLSON, KENNETH E., Chicago, Engineering.
PRICE, JOHN C., Deerfield, Physics.
ROBBERT, JAMES L., Ottawa, Engineering.
RUDNICK, NANCY J., La Grange, Physics.
SIMON, NANCY J., Le Grange, Physics.
SWANK, ROBERT A., Urbana, Physics.
SWANK, BYRON, Lydus, Chicago, Chemistry.
SWIDEN, ANNA Y., Chicago, Physics.
TINKLER, JACK D., Lansing, Engineering.
TREDWELL, JOHN, Chicago, Engineering.
USSING, JOHN J., Chicago, Engineering.
VOLZ, RICHARD A., Woodstock, Engineering.
WEINER, JOHN L., Chicago, Earth Sciences.
ZIMMERMAN, JOHN L., Champaign, Zoology.
Cooperative Graduate
ACKERMAN, BERNICE, Chicago, Earth Sciences.
AHRENKIEL, RICHARD K., Athens, Physics.
ALLEN, RICHARD R., Belleville, Physics.
BRUSELE, MURIEL L., Chicago, Zoology.
BLAIR, LAWRENCE J., Tilden, Zoology.
BRANDON, RONALD A., Champaign, Zoology.
BROWN, BERNARD T., O'Fallon, Engineering.
BRITA, WILLIAM J., Chicago, Engineering.
CALLISON, DONALD E., Tampa, Engineering.
CHLOPEK, FRANK J., Berwyn, Chemistry.
ILLINOIS—Continued

CLAUSSING, ARTHUR M., Palatine, Engineering.

CLEON, VICTOR, Urbana, Chemistry.

COATES, ROBERT M., Palatine, Chemistry.

COLEMAN, NELLY L., Loda, Zoology.

DAMMANN, JAMES E., Wood River, Social Sciences.

DORN, GORDON L., Chicago, Genetics.

DUDLEY, RICHARD M., Florence, Mathematics.

FELDMAN, ALBERT, Chicago, Physics.

FITZGERALD, THOMAS J., Chicago, Engineering.

FOX, WILLIAM T., Evanston, Earth Sciences.

GRAY, LEE T., Chicago, Chemistry.

GRANT, GEORGE C., Urbana, Mathematics.

GRIFFIN, JOHN R., Du Quoin, Engineering.

GROSSMAN, NATHANIEL, Aurora, Mathematics.

GWINN, DONALD E., Urbana, Chemistry.

HAGEN, CARL R., Chicago, Physics.

HANSON, WILLARD J., Elk Grove Village, Earth Sciences.

JOHNSON, GLYN R., Genesco, Agriculture.

JOHN, ROBERT M., Urbana, Engineering.

KASIE, JOHN D., Lemont, Engineering.

KERRIS, JERRY P., Chicago, Engineering.

KIRBY, DAVID B., Urbana, Engineering.

KLEIN, HARVEY S., Chicago, Chemistry.

LAW, ANDREW M., Springfield, Physics.

LARSON, JOHN G., Knoxville, Chemistry.

LABAINE, ALFRED D., Chicago, Mathematics.

LEE, KATHARINE W., Chicago, Biochemistry.

LYTLE, DAVID L., Wilmingtom, Chemistry.

MACPHERSON, CONSTANTINE, Chicago, Biochemistry.

MALVICK, ALLAN J., Oak Lawn, Engineering.

MATHEWS, WEYLEY N., Jr., Champaign, Agricultural Sciences.

MCCLAUHY, JOHN T., Paris, Engineering.

MC CORMICK, NORMAN J., Normal, Engineering.

MC SCARBE, JOHN A., Oak Lawn, Engineering.

MEYER, JOHN S., Lamolile, Mathematics.

MEYER, MARSHALL D., Beardstown, Engineering.

MORAN, DANIEL A., Chicago, Mathematics.

MORRISON, JAMES D., Evanston, Chemistry.

MORES, THEODORE P., Evanston, Engineering.

NUTTAL, RONALD L., Downdar Grove, Psychology.

O'CONNELL, EDWARD J., Jr., Evanston, Psychology.

PERLMUTTER, DAVID M., Glencoe, Social Sciences.

PHANE, SAM P., Rockford, Chemistry.

RIDER, WILLIAM A., Evanston, Physics.

REHM, RONALD G., Glen Ellyn, Engineering.

RIENS, LEWIS F., Urbana, Engineering.

ROSENKRANTZ, WALTER A., Chicago, Mathematics.

RUTLEDGE, ROBERT B., III, St. Louis, Mathematics.

SAXBE, VERNON E., Chicago, Engineering.

SATURE, NORMAN F., Elmhurst, Engineering.

SCHMIDT, HAROLD W., Schiller Park, Agriculture.

SMITH, HARRIET J., Chicago, Botany.

SPITZLER, THOMAS M., Chicago, Chemistry.

SCHNITZER, RICHARD, Evanston, Earth Sciences.

STEWEN, GEORGE W., Chicago, Chemistry.

Swofford, HAROLD S., Jr., Champaign, Chemistry.

SYLVESTER, RAYMOND M., Chicago, Chemistry.

TAYLOR, DAVID W., Champaign, Biochemistry.

TRAPP, CHARLES A., Chicago, Chemistry.

TURNER, FRED A., Chicago, Chemistry.

VILLASENO, MIRNA R., Chicago, Biochemistry.

WADE, DAVID C., Champaign, Engineering.

WALLER, DAVID W., Bellwood, Zoology.

WATSON, HOWARD L., Jr., Arlington Heights, Mathematics.

WEINER, HOWARD J., Chicago, Physics.

WIEDEMANN, ALFRED M., Naperville, Agriculture.

WILLIAMS, GLENN F., Chicago, Psychology.

WINNICK, JACEK, Chicago, Engineering.

WITT, GERARD J., Alton, Physics.

WOOD, ALLEN D., Palos Heights, Engineering.

WYSECKI, ALLEN J., Chicago, Chemistry.

Postdoctoral

BAKER, ROBERT H., Jr., Evanston, Biochemistry.

BEECK, JAMES R., Champaign, Chemistry.

BISCHOFF, KENNETH R., Chicago, Engineering.

BJORKEN, JAMES D., Park Ridge, Physics.

COONEY, DAVID P., Evanston, Medical Sciences.

GALLAGHER, JAMES J., Champaign, Psychology.

GOLDBERG, JAY M., Chicago, Psychology.

HAGER, EDWARD B., Hubbard Woods, Medical Sciences.

HARRIS, BRUNO, Evanston, Mathematics.

HARRIS, SAMUEL M., Chicago, Physics.

KATOH, ARTHUR K., Urbana, Zoology.

KINZET, WARNER G., Chicago, Anthropology.

KLIEB, MILES V., Chicago, Physics.

MACKETT, WILLIAM H., Elgin, Genetics.

MINN, FREDERICK L., Waukegan, Chemistry.

MORRILL, RICHARD L., Evanston, Social Sciences.

OLOFSON, ROY A., Chicago, Chemistry.

SCHLESSINGER, DAVID, Chicago, Biochemistry.

STEHINART, JOHN S., Chicago, Earth Sciences.

TALBOTT, RICHARD L., Elmhurst, Chemistry.

WARD, HAROLD R., Mt. Vernon, Chemistry.

WEISS, GUIDO L., Chicago, Mathematics.

WOLFE, NORMAN S., Chicago, Medical Sciences.

Senior Postdoctoral

ATWOOD, KIMBALL C., Chicago, Genetics.

BOGODAD, LAWRENCE, Chicago, Biochemistry.

LABHOF, RICHARD K., Chicago, Mathematics.

YANKWICH, PETER E., Urbana, Chemistry.

Science Faculty

BEACH, NEIL W., Lake Forest, Zoology.

BERGSTROM, ROBERT C., Cicero, Earth Sciences.

CARNEY, ROSS A., Little, Physics.

CLARKE, HELEN L., Evanston, Mathematics.

EMBREE, EARL C., Alton, Mathematics.

HARMET, KENNETH H., De Kalb, Botany.

LANDIN, JOSEPH, Urbana, Mathematics.

LINDBECK, WENDELL A., De Kalb, Chemistry.

MARK ABRAHAM M., Carbondale, Mathematics.

MILLER, ROBERT L., Urbana, Chemistry.

MOBORG, ROBERT J., Urbana, Engineering.

MURPHY, KENNETH H., Urbana, Mathematics.

MURPHY, KENNETH W., Macomb, Physics.

PALMER, ROBERT M., Chicago, Physics.

SIBLEY, JACEK, Chicago, Mathematics.

STOECKEL, WILBERT F., Urbana, Engineering.
WISINGER, FREDERICK P., Urbana, Engineering.

Summer Fellowships for Graduate Teaching Assistants

BARE, WALTER S., Glencoo, Physics.
BARKER, JOHN L., Jr., Chicago, Chemistry.
BAUMAN, STEVEN F., Urbana, Mathematics.
BIELER, LARRY G., East Carondelet, Earth Sciences.
BLUM, WALTER C., Chicago, Zoology.
BURDI, ALPHONSE R., Chicago, Medical Sciences.
CARL, JAMES D., Centralia, Earth Sciences.
CHITTENDEN, DAVID H., Hazel Crest, Engineering.
DEMAR, RALPH A., Jacksonville, Mathematics.
DEKKER, JOHN E., Chicago, Mathematics.
DYBY, DOUGLAS H., Champaign, Chemistry.
FISHER, WILLIAM L., Marion, Earth Sciences.
FOLLI, WESLEY K., Elgin, Physics.
FORD, JAMES A., Glenview, Engineering.
FRANK, FRANK A., Urbana, Zoology.
GERBER, NORMAN W., Chicago, Chemistry.
GERMANAS, DALIA, St. Charles, Chemistry.
GOLDMAN, JACK L., Chicago, Chemistry.
GUNNERY, DONALD F., Jr., Chicago, Engineering.
HAYNES, LESSO W., Urbana, Chemistry.
HIBEN, JOHN A., Glen Ellyn, Engineering.
IWASTK, JOHN M., Bellwood, Engineering.
JOESTEN, MELVIN D., Rochelle, Chemistry.
KENT, JOHN C., Arlington Heights, Engineering.
LANGBEIN, GEORGE, Champaign, Mathematics.
LARSON, CARL S., Urbana, Engineering.
LEAF, GARY K., Champaign, Mathematics.
LIBER, TED, Chicago, Engineering.
LIND, DAVID L., Wilmington, Chemistry.
NEAL, ROBERT S., Champaign, Chemistry.
NEMETH, EDWARD M., S.J., Chicago, Chemistry.
NEWCOMER, RICHARD J., Princeton, Zoology.
O'BREIN, RONALD J., Chicago, Physics.
O'NEILL, JAMES R., Chicago, Chemistry.
PETERS, JOSEPH A., Urbana, Mathematics.
PITTER, ROBERT B., Evanston, Engineering.
PRANGER, WALTER A., Jr., Cicero, Mathematics.
ROGOS, ELLIOTT A., Urbana, Earth Sciences.
SALERS, HARVEY E., Chicago, Anthropology.
SNITKER, MARTHA L., Ohlman, Chemistry.
STEINMETZ, RICHARD, Evanston, Earth Sciences.
STOICHERMAN, DAVID L., Charleston, Chemistry.
STUERN, EDWIN F., Chicago, Mathematics.
SWOFFORD, HAROLD S., Jr., Champaign, Chemistry.
TIPTON, CHARLES M., Champaign, Medical Sciences.
WAND, ARNOLD C., Chicago, Chemistry.
WALLER, THOMAS R., Elmhurst Park, Earth Sciences.
WARD, HAROLD R., Mt. Vernon, Chemistry.
WINNER, HOWARD J., Chicago, Physics.
WITTMOTT, WILLIAM G., Chicago, Mathematics.

Summer Fellowships for Secondary School Teachers

BAUER, ST. M. DANA, Chicago, Biology.
BUCKLER, WILLIAM F., Aurora, Mathematics.
BURB, ROBERT BYRON, Peoria, General Sciences.
BURROW, GEORGE ILYING, Port Byron, General Sciences.
CHRISTIAN, RAYMOND E., Chicago, Chemistry.
DEVINE, DONALD F., Park Forest, Mathematics.
EGOLF, THOMAS HENRY, Belleville, Physics.
HALL, RICHARD LOWELL, Evanston, Chemistry.
HART, GROUCH E., Evanston, Mathematics.
HILL, HUBERT WOOF, Chicago, Mathematics.
HINES, EDWARD N., Maywood, Mathematics.
HOOVER, JAMES M., Batavia, Botany.
JAMES, BRUCE P., Winnetka, Mathematics.
KOEHLER, ST. EVANGELISTA, Lagrange Park, Biology.
KRYCH, ST. M. ANNELE, Chicago, Biology.
LADD, NORMAN ELMER, Des Plaines, Mathematics.
LEATHERMAN, LES J., Northbrook, Biology.
LINDHORN, ROBERT C., Berwyn, Mathematics.
McNEAL, MOTH, MATTHIAS, Decatur, Biology.
MUCKERMANN, ST. M. ALPHON, Breese, Biology.
MULLER, PAUL NEAL, Arlington Heights, General Sciences.
MUNSON, NORMA F., Libertyville, Biology.
ROYTE, JAMES PAUL, Dongola, Biology.
RUD, ST. BERNARD MARY, Chicago, Biology.
RUDOLPH, EARL S., Decatur, Chemistry.
RUEFF, LAWRENCE E., Decatur, Biology.
SCHERRER, ROBERT HOWELL, Decatur, Biology.
STREETON, WILLIAM C., LaGrange, Mathematics.
TENNEN, ARTHUR EDWARD, Winnetka, Mathematics.
WALKER, ELIZABETH M., Hindale, Mathematics.
ZALOKAR, RONALD S., Roseville, Biology.
ZOBOWSKI, RICHARD A., Indianapolis, Mathematics.
ZIMMERMAN, ROBERT M., East Moline, Mathematics.

INDIANA

Graduate

BELINFANTE, JOAN G., W. Lafayette, Physics.
COLEMAN, WILLIAM H., Vincennes, Social Sciences.
FISCH, MICHAEL H., Indianapolis, Chemistry.
FISHER, THORNTON R., Indianapolis, Physics.
KOZUKA, JOHN H., Gary, Engineering.
KOYATIS, THOMAS A., Ft. Wayne, Physics.
LARNER, DANIEL M., Indianapolis, Social Sciences.
LEGG, JAMES C., Windfall, Physics.
MARTIN, EDWARD S., Terre Haute, Chemistry.
MILES, GLEN A., Cloverdale, Engineering.
NARDIN, LEWIS K., Indianapolis, Genetics.
NEUMANN, HOLV W., Bloomington, Anthropology.
PARK, JAMES T., Lebanon, Mathematics.
PETERS, PHILIP C., Chesterton, Physics.
POHL, WILLIAM F., Michigan City, Mathematics.
PURCELL, STEPHEN A., Indianapolis, Engineering.
RAGLAND, THOMAS E., North Salem, Biochemistry.
RIGG, ROBERT G., Hammond, Engineering.
ROOT, FORREST K., Bedford, Earth Sciences.
SANDERS, WILLIAM A., Oxford, Chemistry.
SCHERRER, KAY V., Jr., Evanston, Chemistry.
### INDIANA—Continued

**Schmalberger, Donald C., Bloomington, Astronomy.**

**Sherwood, Bruce A., W. Lafayette, Physics.**

**Sims, Charles C., Elkhart, Mathematics.**

**VanDevelde, Joseph R., West Baden Springs, Mathematics.**

**Cooperative Graduate**

**Blackwell, Frederick W., Elkhart, Mathematics.**

**Boshman, Louis I., St. Meinrad, Engineering.**

**Bosman, Wayne C., Crawfordsville, Physics.**

**Brunner, Philip W., Osvald, Engineering.**

**Chidister, Jerry L., Goshen, Engineering.**

**Cole, Michael, Bloomington, Psychology.**

**Cork, Max J., Terre Haute, Engineering.**

**Davidson, Bernard R., Bloomington, Chemistry.**

**Day, George W., W. Lafayette, Mathematics.**

**DeHaan, Franklin P., W. Lafayette, Chemistry.**

**DeRudder, Ronald D., Bloomington, Earth Sciences.**

**Dilling, Wendell L., W. Lafayette, Chemistry.**

**Emmerson, John L., Owensville, Medical Sciences.**

**Fullen, Ray W., W. Lafayette, Biochemistry.**

**Grossman, Richard F., Marlon, Chemistry.**

**Kellam, John M. Jr., Indianapolis, Engineering.**

**Kendall, Stephen B., Marlon, Psychology.**

**Knill, Ronald J., Notre Dame, Mathematics.**

**Lawvere, Francis W., Jr., Upland, Mathematics.**

**Lindley, William T., Ft. Wayne, Engineering.**

**McCarty, Charles B., Lawrenceburg, Engineering.**

**Mosey, James F., Indianapolis, Engineering.**

**O'Neill, Ronald C., Lafayette, Mathematics.**

**Parks, Stanton J., Indianapolis, Engineering.**

**Rhode, Jasper L., Lafayette, Physics.**

**Thompson, Matnard D., Michigan City, Mathematics.**

**Wheeler, Joseph D., W. Lafayette, Engineering.**

**Postdoctoral**

**Williams, Robert F., W. Lafayette, Mathematics.**

**Zeps, Valdis J., Bloomington, Social Sciences.**

**Senior Postdoctoral**

**Axelrod, Bernard, Lafayette, Biochemistry.**

**Bos, Marc H., Bloomington, Physics.**

**Carbonell, Clifford A., Bloomington, Mathematics.**

**Science Faculty**

**Brestcher, Miriam E., Valparaiso, Mathematics.**

**Dossen, Gerald E., Munice, Chemistry.**

**Emery, Alden H., Jr., Lafayette, Engineering.**

**Martin, St. M., Celine, Fort Wayne, Biology.**

**Murphy, Frederick Michael J., Notre Dame, Earth Sciences.**

**Panchal, Homer D., Munice, Zoology.**

**Schaaf, Ward B., Bloomington, Chemistry.**

**Telfair, David, Richmond, Physics.**

**Tressler, John B., Angola, Physics.**

**Summer Fellowships for Graduate Teaching Assistants**

**Burlington, Roy F., W. Lafayette, Zoology.**

**Coleman, William II., Vincennes, Social Sciences.**

**Denise, Richard W., W. Lafayette, Engineering.**

**DeRubertis, Ronald D., Bloomington, Earth Sciences.**

**Green, John W., Garrett, Chemistry.**

**Hanson, George P., Bloomington, Genetics.**

**Johnson, Lowell B., W. Lafayette, Botany.**

**Kiefer, James E., Plymouth, Chemistry.**

**Kieser, Charles A., South Bend, Physics.**

**Kirk, William A., Reelsville, Mathematics.**

**May, Marshall S., Bloomington, Physics.**

**McDowell, John W., Jr., Bloomington, Chemistry.**

**Meinhold, Ernest R., South Bend, Engineering.**

**Rickert, Donald O., W. Lafayette, Chemistry.**

**Uckers, Francis A., Fort Wayne, Botany.**

**Wilson, Howard L., Bloomington, Physics.**

**Young, Paw M., W. Lafayette, Mathematics.**

**Summer Fellowships for Secondary School Teachers**

**Allen, Jesse Byron, Whiting, Mathematics.**

**Budensiek, Ronald Keith, Munice, Chemistry.**

**Chabill, L. Delmar, Logansport, Mathematics.**

**Dunne, Gilbert, Michigan City, Biology.**

**DeYoung, Patricia J., W. Lafayette, Mathematics.**

**Flansburg, Glenn E., Hammond, Mathematics.**

**Friedrick, Terry Joe, Vincennes, Mathematics.**

**Goodnight, Frederick H., North Judson, Biology.**

**Kincard, Wayne H., Indianapolis, General Sciences.**

**Payne, Kenneth Earl, Terre Haute, Biology.**

**Ramsey, Viola Alice, Indianapolis, Mathematics.**

**Rice, Jack Allen, Logansport, Mathematics.**

**Schilling, Robert G., Frankfort, Mathematics.**

**Smith, Marvin Delbert, Indianapolis, Biology.**

**Smith, Mary Carolyn, Hoagland, Mathematics.**

**White, Stanley A., Clarksville, Mathematics.**

**IOWA**

**Graduate**

**Anderson, James R., Ames, Physics.**

**Berge, Glenn L., Decorah, Astronomy.**

**Bixby, John C., Ames, Engineering.**

**Egger, Carl T., Monticello, Engineering.**

**Hall, Grace W., Iowa City, Chemistry.**

**Ham, St. M., Antonia, Dubuque, Genetics.**

**Hanson, Frank E., Jr., Hawarden, Zoology.**

**Kohlmann, David L., Lamoni, Engineering.**
<table>
<thead>
<tr>
<th>Name</th>
<th>City, Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANDWEBER, Peter S.</td>
<td>Iowa City, Mathematics</td>
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<tr>
<td>LILLEHOJ, EVIVD B.</td>
<td>Kimballton, Botany</td>
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<td>NICOLSON, DAN H.</td>
<td>Shenandoah, Botany</td>
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<td>POLING, JOHN C.</td>
<td>Breda, Mathematics</td>
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<td>PULLEY, ARDEN O.</td>
<td>Ames, Biochemistry</td>
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<td>SAGERMAN, Peter B.</td>
<td>Cedar Rapids, Chemistry</td>
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<td>STUDIER, FREDERICK W.</td>
<td>Waverly, Botany</td>
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<td>SUNDBERG, RICHARD J.</td>
<td>Lind Grove, Chemistry</td>
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<td>THOMAS, BRUCE R.</td>
<td>Guthrie Center, Physics</td>
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<td>TOGAS, JAMES B.</td>
<td>Fort Dodge, Chemistry</td>
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<td>WEIDLER, DONALD J.</td>
<td>New Hampton, Zoology</td>
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<td>BERGSEN, JOHN E.</td>
<td>Sioux City, Physics</td>
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<td>BOYD, ARN M.</td>
<td>Ames, Engineering</td>
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<td>CARLSON, CLARENCE A., Jr.</td>
<td>Ames, Botany</td>
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<td>CHRISTIANSEN, BRYANT N.</td>
<td>Ogden, Engineering</td>
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<td>GREGG, CHARLES A.</td>
<td>Charlotte, Engineering</td>
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<td>GRUBER, MAURICE M.</td>
<td>Des Moines, Genetics</td>
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<td>GUTALN, GERALD S.</td>
<td>Cedar Falls, Physics</td>
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<td>HAINES, HUBERT D.</td>
<td>Ames, Botany</td>
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<td>HOFFMAN, LARRY E.</td>
<td>Sigourney, Botany</td>
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<td>HORNOKER, MAURICE G.</td>
<td>Alleton, Zoology</td>
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<td>HOWEY, EUGENE P.</td>
<td>Fairfield, Social Sciences</td>
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<td>JOHNSON, KENT E.</td>
<td>Davenport, Earth Sciences</td>
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<td>KLEENE, ROGER A.</td>
<td>Ames, Agriculture</td>
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<td>KRISTIANSON, BRYANT N.</td>
<td>Ogden, Engineering</td>
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<td>LIGON, JAMES T.</td>
<td>Ames, Engineering</td>
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<td>MARSHALL, MARILYN E.</td>
<td>Iowa City, Psychology</td>
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<td>MARTIN, JOSEPH M.</td>
<td>Keokuk, Mathematics</td>
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<td>MATTHE, DONALD E.</td>
<td>Ames, Botany</td>
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<td>PETRO, JOHN W.</td>
<td>Iowa City, Mathematics</td>
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<td>RATLIFF, LOUIS J.</td>
<td>Marion, Mathematics</td>
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<td>RUSSEL, NANCY J.</td>
<td>Ames, Zoology</td>
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<td>SCAVEN, LEROY C.</td>
<td>Cedar Rapids, Genetics</td>
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<td>SMALLEY, KATHRINE N.</td>
<td>Iowa City, Zoology</td>
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<td>SMITH, KRIST P.</td>
<td>Boone, Mathematics</td>
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<tr>
<td>TRAFOLD, MILTON A.</td>
<td>Iowa City, Psychology</td>
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<tr>
<td>WATSON, GEORGE A.</td>
<td>Knoxville, Engineering</td>
</tr>
<tr>
<td>WAUKER, JOHN C.</td>
<td>Sioux City, Engineering</td>
</tr>
<tr>
<td>WOONG, ROBERT W.</td>
<td>Newton, Chemistry</td>
</tr>
<tr>
<td>BUESKE, ROBERT C.</td>
<td>Ames, Mathematics</td>
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<tr>
<td>CHAMFITZ, PHILIP T.</td>
<td>Des Moines, Zoology</td>
</tr>
<tr>
<td>CORLIS, LEO B.</td>
<td>Des Moines, Chemistry</td>
</tr>
<tr>
<td>JOHNSON, BRUCE L.</td>
<td>Ames, Engineering</td>
</tr>
<tr>
<td>KAPPPE, GILBERT J.</td>
<td>Iowa City, Earth Sciences</td>
</tr>
<tr>
<td>LUTHER, NORMAN Y.</td>
<td>Iowa City, Mathematics</td>
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<tr>
<td>MARTIN, JOSEPH M.</td>
<td>Keokuk, Mathematics</td>
</tr>
<tr>
<td>McINTOSH, THOMAS H.</td>
<td>Ames, Agriculture</td>
</tr>
<tr>
<td>MICKLEBERGER, ROGER L.</td>
<td>Grinnell, Agriculture</td>
</tr>
<tr>
<td>MULFORD, CHARLES L.</td>
<td>Iowa Falls, Social Sciences</td>
</tr>
<tr>
<td>RICHARDSON, WILLIAM H.</td>
<td>Ames, Mathematics</td>
</tr>
<tr>
<td>RISNER, BENJAMIN A.</td>
<td>Northwood, Mathematics</td>
</tr>
<tr>
<td>SCHMITZ, FRANCIS J.</td>
<td>Jesup, Chemistry</td>
</tr>
<tr>
<td>SMALLEY, KATHERINE N.</td>
<td>Iowa City, Zoology</td>
</tr>
<tr>
<td>SMITH, KENNETH P.</td>
<td>Boone, Mathematics</td>
</tr>
<tr>
<td>THOMAS, ROBERT W., Jr.</td>
<td>Ames, Social Sciences</td>
</tr>
</tbody>
</table>

## Summer Fellowships for Secondary School Teachers

- Chrapko, J., F., Keokuk, Mathematics.
- Ebert, W., E., Clarion, Biology.
- Fett, G., Aurella, Mathematics.
- Hoehlefeld, J., F., Cedar Falls, Mathematics.
- Mauseth, F., Iowa City, Biology.
- Opland, E., Fort Madison, Biology.
- Osher, W., F., Marshalltown, Mathematics.
- Schaub, R., Titonka, Mathematics.
- Snyder, J., D., Carroll, Mathematics.

## Kansas Graduate

- Berry, W., H., Kansas City, Mathematics.
- Cederberg, J., W., Herndon, Physics.
- Davis, J., A., Jr., Topeka, Engineering.
- Eno, P., Paul P., Perry, Earth Sciences.
- Fieck, Frank D., Lawrence, Physics.
- Fite, S., Bernard H., Emporia, Zoology.
- Harms, C., Florence, Biology.
- Hays, Byron G., Wichita, Chemistry.
- Johnson, M., Fort Scott, Agriculture.
- Keever, W., C., Kansas City, Chemistry.
- Ontjes, D., A., Hutchinson, Medical Sciences.
- Ramsay, A., L., Dodge City, Mathematics.
- Richert, A., S., Wichita, Physics.
- Roberts, J., W., Shawnee, Chemistry.
- Schweizer, D., W., Hutchinson, Biology.
- Shimp, S., D., Wichita, Mathematics.
- Templer, W., H., Lawrence, Physics.
- Whitbread, C., J., St. John, Microbiology.
- Urschel, W., J., Lawrence, Physics.

## Postdoctoral

- Roberts, W., Leavitt, E., Tampani, Biochemistry.
- Good, R., Roland E., Jr., Iowa City, Physics.
- Thorne, R., Robert F., Iowa City, Botany.

## Science Faculty

- Anderson, Paul M., Iowa City, Engineering.
- Hagan, S., Mary M., Dubuque, Chemistry.
- Kennelly, S., Mary M., Dubuque, Chemistry.
- Streib, W., Iowa City, Engineering.

## Summer Fellowships for Graduate Teaching Assistants

- Buehler, W., Ames, Engineering.
- Biremhold, Dale E., Prairie City, Zoology.
KANSAS—Continued

HOBSON, ARTHUR S., Manhattan, Physics.
HORNE, FREDERICK H., Mission, Chemistry.
JUSTICE, WAYMAN P., Manhattan, Genetics.
MAES, RICHARD A., Manhattan, Psychology.
MANAHAN, STANLEY E., Peabody, Chemistry.
MCCARTY, CHARLES G., Wichita, Chemistry.
PLATT, DWIGHT R., Newton, Zoology.
RUMFORD, MAX L., Ogallala, Chemistry.
SKINNER, JAMES L., Lincoln, Engineering.
SNIBBE, RICHARD A., Manhattan, Psychology.
TUCKER, PATRICIA A., Emporia, Mathematics.
WEIDMAN, DONALD R., Kansas City, Mathematics.
ZAHNLEY, JAMES C., Manhattan, Biochemistry.

Science Faculty

CLARKE, ROBERT F., Emporia, Zoology.
LINDLY, EDWIN C., Manhattan, Engineering.
PROPHET, CAEL W., Emporia, Zoology.
SIMPKIN, WILLIAM E., Wichita, Engineering.

Summer Fellowships for Graduate Teaching Assistants

BROWN, SHANNON R., Topeka, Social Sciences.
FISHER, VERNON B., Parsons, Engineering.
GAUGHAN, EDWARD D., Lawrence, Mathematics.
HIBBS, WILLIAM L., Phillipsburg, Earth Sciences.
JOHNSON, RALPH T., Jr., Salina, Physics.
JOHNSON, DEJANZI M., Great Bend, Physics.
LONG, JOHN B., Topeka, Psychology.
MANUEL, OLIVIER K., Wichita, Chemistry.
ROGERS, GARY B., Manhattan, Engineering.
STUTCH, CHARLES J., Lawrence, Mathematics.

Summer Fellowships for Secondary School Teachers

ALDRIDGE, BILLY G., Bethel, Physics.
DAVISON, JOSPEH G., Bethel, Biology.
FENNER, RICHARD R., Scott City, Biology.
EISELE, GEORGE ANTHONY, Quinter, Mathematics.
HENDRICKS, JULIA C., Kansas City, Mathematics.
HUNTINGTON, L., Wichita, Biology.
JANSEN, JOHN N., Liberal, Mathematics.
MILLS, ROBERT B., Topeka, Biology.
PETERS, WILLARD H., Wichita, Biology.

KENTUCKY

Graduate

ALVORD, WILLIAM K., Lexington, Engineering.
HARDIN, BOBBY O., Lexington, Engineering.
KONZLER, THOMAS R., Henderson, Biology.
LACY, WILLIAM M., Millersburg, Physics.
MELTON, CHARLES G., Jr., Henderson, Biology.
PORTER, MARCELLUS C., Louisville, Engineering.
RIGHI, CHARLES E., Jr., Louisville, Engineering.
SUICH, JOHN E., Louisville, Engineering.
WEISS, WILLIAM L., Louisville, Physics.
WHITESIDES, GEORGE M., Anchorage, Chemistry.

Cooperative Graduate

ADE, FREDERICK C., Louisville, Engineering.
BEALS, RALPH E., Lexington, Social Sciences.
CAMMACK, FLOYD M., Lexington, Anthropology.

CHAVENS, NORMAN Y., Owensboro, Engineering.
CRAWFORD, THOMAS H., Louisville, Chemistry.
HOCHSTETTNER, DONALD L., Fisherville, Anthropology.
HORNAN, SR. BENEDETTO, Louisville, Chemistry.
INMAN, WILLIAM C., Lexington, Psychology.
KAPFESIAN, RALPH, Louisville, Engineering.
LAMB, RICHARD C., Lexington, Physics.
MATTOX, DONALD M., Lexington, Physics.
MILLER, JAMES R., Louisville, Agriculture.
MONNO, BURT L., Jr., Anchorage, Zoology.
MOORE, GEORGE C., Bowling Green, Physics.
RAMAY, KERRITT C., Lexington, Chemistry.
RICHARDS, ROBERT L., Lexington, Chemistry.
SLAUGHTER, GEORGE T., Hardvill, Engineering.

SLEDD, WILLIAM T., Murray, Mathematics.
STAPLES, CODY E., Louisville, Chemistry.
WITTE, C. GAY, Louisville, Psychology.

Postdoctoral

GRAY, HARRY B., Bowling Green, Chemistry.

Science Faculty

CHEATHAM, NELL SUE, Morehead, Zoology.
JENNINGS, LEWIS B., Jr., Louisville, Engineering.
MARTIN, MAURICE K., Lexington, Engineering.
SMITH, CHARLES G., Paducah, Zoology.
STICKLER, THOMAS D., Berea, Physics.

Summer Fellowships for Graduate Teaching Assistants

BYRD, DAVID S., Louisville, Chemistry.
COLEMAN, DONALD B., Owensboro, Mathematics.
KING, JERRY P., Murray, Mathematics.
REKER, JOSEPH R., Louisville, Engineering.
SLEDD, WILLIAM T., Murray, Mathematics.
TILFORD, SHERIDAN G., Covington, Chemistry.

Summer Fellowships for Secondary School Teachers

HERMANN, SR. M. CAROLINE, Covington, Biology.
KIMBLE, SR. M. EVA, Louisville, Chemistry.
KLINGenberg, SR. J. M., Covington, Mathematics.
MADDEN, SR. M. CARCILLA, Covington, Physics.
ROSE, VIRGIL UHLAN, Louisville, Biology.
STALLINGS, SR. M. CONSOLA, Springfield, Mathematics.
STURMAN, DOLLY G., Louisville, Mathematics.
SYKES, HARRY N., Lexington, Mathematics.
WARE, WILLA C., Louisville, Mathematics.

LOUISIANA

Graduate

BERGERON, WILLIAM J., Eunice, Engineering.
CARROLL, KEITH J., New Iberia, Physics.
FRIESEN, RAYMOND L., New Orleans, Physics.
GRAHAM, EDWARD W., Natchitoches, Chemistry.
MURHILL, PAUL W., Lake Charles, Engineering.
NIX, JAMES B., Natchitoches, Physics.
PRENET, DAVID E., New Orleans, Mathematics.
### Maine

**Graduate**
- **Burns, Stephen H.**, Friendship, Physics.
- **Myersman, Mathew A.**, Lewiston, Earth Science.
- **O'Connor, Brian R.**, Lewiston, Chemistry.
- **Scott, Sarah V.**, Bar Harbor, Anthropology.
- **Turner, James H.**, Skowhegan, Physics.

**Cooperative Graduate**
- **Agathos, Louis**, Orono, Engineering.
- **Baron, Rose M.**, Orono, Social Sciences.
- **Brown, Karen M.**, Thomaston, Psychology.
- **Furrow, Stanley D.**, Bangor, Chemistry.
- **Orcutt, Ronald H.**, Rockland, Chemistry.
- **Perrin, Carlisle E.**, Falmouth, Chemistry.

### Science Faculty
- **Dodge, Clayton W.**, Orono, Mathematics.
- **Lacasse, Elroy O.**, Jr., Brunswick, Physics.

### Summer Fellowships for Graduate Teaching Assistants
- **Barker, Daniel S.**, North Whitefield, Earth Sciences.
- **Hart, John K.**, Fort Kent, Physics.
- **Kuch, Nathan H.**, Orono, Astronomy.
- **Sotter, Theodore W.**, Orono, Chemistry.

### Maryland

**Graduate**
- **Anderson, Don L.**, Baltimore, Earth Sciences.
- **Brown, Robert L.**, Kensington, Chemistry.
- **Brown, Stanley G.**, Kensington, Physics.
- **Curts, Edward B.**, Annapolis, Mathematics.
- **Denhardt, David T.**, Baltimore, Biophysics.
- **Dobson, Peter N. Jr.**, Baltimore, Physics.
- **Dunleavy, Sr., M. Rosaleen**, Baltimore, Microbiology.
- **Dwyer, Thomas P.**, Baltimore, Engineering.
- **Ferguson, John D.**, Bishop Head, Mathematics.
- **Foys, Wade H. Jr.**, Baltimore, Engineering.
- **Haue, Peter**, Chevy Chase, Chemistry.
- **Holliday, Nicholas D.**, Chevy Chase, Zoology.
- **Licht, Arthur L.**, Silver Spring, Physics.
- **Meckel, Lawrence D. Jr.**, Baltimore, Earth Sciences.
- **Milled, William H. Jr.**, Baltimore, Physics.
- **Morris, John E.**, Silver Spring, Biochemistry.
- **Sharnoff, Mark**, Chevy Chase, Physics.
- **Seger, Alvin**, Baltimore, Biophysics.
- **Smith, David A.**, Pocomoke City, Mathematics.
- **Vanterres, Harry L. Jr.**, Glen Burnie, Engineering.
- **Wells, Robert**, Bethesda, Mathematics.
- **Whitlock, Howard W. Jr.**, University Park, Chemistry.
- **Zipp, Edward C. Jr.**, Baltimore, Physics.

**Cooperative Graduate**
- **Aks, Stanley**, College Park, Physics.
- **Berk, Kenneth N.**, Hyattsville, Physics.
- **Burns, Maurice M.**, Baltimore, Chemistry.
- **Dunn, Conrad E. Jr.**, Baltimore, Chemistry.
- **Fine, Donald L.**, Baltimore, Engineering.

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### Science Faculty
- **Aucocin, Clayton V.**, LaFayette, Mathematics.
- **Edwards, Charles H. Jr.**, Ruston, Engineering.
- **Eskewman, Howard C.**, LaFayette, Chemistry.
- **Frederick, LaFayette**, Baton Rouge, Botany.
- **Timon, William E. Jr.**, Natchitoches, Mathematics.

### Summer Fellowships for Graduate Teaching Assistants
- **Larkin, Joel M.**, New Orleans, Chemistry.
- **Lewis, Loralee L.**, New Orleans, Zoology.
- **Simmons, Leonard M. Jr.**, Baton Rouge, Physics.
- **Wharton, James H.**, Monroe, Chemistry.
- **Willard, Thomas M.**, New Orleans, Chemistry.

### Summer Fellowships for Secondary School teachers
- **Dunn, Eunice R.**, Monroe, Mathematics.
- **EDN, Mabel Morgan**, Dubuque, Mathematics.
- **Gillmore, Jerry Lee**, Marksville, Mathematics.
- **McKee, Joyce T.**, New Orleans, Zoology.
- **Thomas, James Orrell**, Haynesville, Mathematics.
MARYLAND—Continued
FORMAN, RICHARD T., Easton, Botany.
FULMER, GERALD L., West Hyattsville, Engineering.
JONES, DONALD C., Takoma Park, Chemistry.
KANTOR, PAUL B., Silver Spring, Physics.
LAMP, DONALD R., Baltimore, Engineering.
LEON, MELVIN, West Hyattsville, Physics.
MADSEN, ERNEST L., District Heights, Physics.
MARTIN, RICHARD L., Baltimore, Engineering.
MULLALLY, JANET J., Bethesda, Mathematics.
QUIN, ROBERT G., Hagerstown, Physics.
RAWLINGS, HOWARD P., Baltimore, Mathematics.
SACK, ROBERT C., Baltimore, Engineering.
WEINER, HARRY W., Jr., Baltimore, Chemistry.

Postdoctoral
ADAMS, WILLIAM H., Glen Burnie, Chemistry.
FISKE, RICHARD S., Baltimore, Earth Sciences.
HOEHMANN, LOUIS G., Baltimore, Microbiology.
STOUT, JOHN F., Takoma Park, Zoology.

Science Faculty
EMERSON, DON L., LaVale, Zoology.
FENZLER, JAMES, Westminster, Medical Sciences.
MUMA, HAROLD E., Baltimore, Zoology.
SCHICK, IRVIN H., Takoma Park, Engineering.

Summer Fellowships for Graduate Teaching Assistants
ADAMS, EDWARD F., Hyattsville, Engineering.
BRIDWELL, GERALD P., Greenbelt, Biochemistry.
BRIDY, ROBERT G., Hagerstown, Chemistry.
FORMAN, RICHARD T., Easton, Botany.
HURLBUTT, HENRY W., College Park, Zoology.
MADSEN, ERNEST L., District Heights, Physics.
STOUT, JOHN F., Takoma Park, Zoology.

Summer Fellowships for Secondary School Teachers
CAREY, HELEN SIMMONS, Catonsville, Mathematics.
FARLEY, WILLIAM J., Baltimore, Mathematics.
PITZPATRICK, SR. ANCILLA, BALTIMORE, Zoology.
GENT, WALTER A., Baltimore, Mathematics.
HOPPERS, SR. MARGARET, Baltimore, Mathematics.
HOPKINS, ELIZABETH E., Beltsville, Mathematics.
JOHNSON, PATRICIA L., Wheaton, Mathematics.
O'NEILL, BRO. CONFIYX C., Baltimore, Mathematics.

STARK, WILLIAM DAVID, SILVER SPRING, General Sciences.

MASSACHUSETTS
Graduate
ALPERIN, JONATHAN L., NEWTON, Mathematics.
BIRMINGHAM, THOMAS J., MILFORD, Physics.
BLUMENTHAL, RALPH B., Cambridge, Physics.
BROWN, MARIANNE S., Waltham, Mathematics.
CARROLL, ALAN S., CAMBRIDGE, Physics.
CHASE, THEODORE, JR., Dyer, Biochemistry.
CLEARY, RICHARD T., Boston, Biochemistry.
COMLY, JAMES E., Cambridge, Engineering.
COVITZ, FRANK H., DORCHESTER, Chemistry.
DIAMOND, JAMES M., Brookline, Medical Sciences.
DIX, MICHAEL W., Wayland, Zoology.
DORRIS, ROBERT R., Boston, Physics.
FEDERER, CHARLES A. III, BOSTON, Agriculture.
FUCHS, NORMAN H., Boston, Physics.
FULTON, ROBERT L., East Weymouth, Chemistry.
GERSTEIN, IRENE S., Cambridge, Physics.
GIBBS, SARAH P., Belmont, Zoology.
GLOWACKI, ELLEN R., Winchester, Biochemistry.
GOLD, LEWIS P., Brockton, Chemistry.
GOODRICH, ROBERT L., Cambridge, Physics.
GUILLMIN, VICTOR W., Belmont, Mathematics.
HOWERD, JOHN L., Quincy, Microbiology.
HUNT, THOMAS E., Belmont, Chemistry.
INGRAM, JOHN C., Boston, Physics.
JAMISON, PAUL W., Cambridge, Engineering.
JOLLY, HENRY P., Jr., Boston, Physics.
KNIGHT, WILLIAM S., West Springfield, Chemistry.
LANDE, ALBERT, Cambridge, Physics.
MARK, ROGER C., Chestnut Hill, Engineering.
MOORE, CHARLES B., Beverly Farms, Chemistry.
NELSON, RALPH D., JR., Westboro, Chemistry.
NESSON, MICHAEL H., Brighton, Microbiology.
POULTNEY, SHERRY K., Leominster, Physics.
RIGBY, PAUL N., Cambridge, Psychology.
SAVAN, HARRIS B., Newton Highland, Psychology.
SCHINRAUM, MONTE L., Cambridge, Chemistry.
SCHELL, ALLAN C., Medford, Engineering.
SCHWENZER, RICHARD L., Cambridge, Chemistry.
SULLIVAN, JEREMIAH D., Foxboro, Physics.
THORNTON, ROBERT M., Cambridge, Botany.
WARD, HAROLD N., Cambridge, Mathematics.
WAXMAN, NAHUM J., Cambridge, Anthropology.
WHITTIER, DEAN E., Millbury, Botany.
WILLIAMS, DAVID C., Belmont, Chemistry.
YOUNG, CHARLES D., Amherst, Biophysics.
Cooperative Graduate
ADAMS, DAVID, Cambridge, Physics.
AYERNE, MELVIN J., Newtonville, Zoology.
BEL, JERRY A., Cambridge, Chemistry.
BONVINI, GLADYS E., West Medway, Genetics.
ELLIOTT, Harold L., Cambridge, Social Sciences.
CHIN, Gilbert Y., Boston, Engineering.
CONLEY, Brenda S., Cambridge, Biology.
Daley, Henry O., Jr., Braintree, Chemistry.
Durbin, Charles B., Waltham, Engineering.
ELLIOTT, Mildred E., Boston, Biology.
FOOKHART, George M., Newtonville, Physics.
FORD, Dwa¡ L., Lancaster, Biochemistry.
FOULD, Donald C., Cambridge, Social Sciences.
GAULD, Nelson S., Allston, Zoology.
HOFMANN, Jerome C., Cambridge, Physics.
Hume, Norman M., Jr., Princeton, Engineering.
KASSERER, Leon, Newtonville, Psychology.
KUSICK, Charles L., Richmond, Engineering.
LEYDE, Robert E., Wellesley Hills, Chemistry.
MILLS, Wayne A., Natick, Physics.
MIDTUN, Otis H., New Bedford, Engineering.
MOORE, William B., Jr., Boston, Medicine.
PASTOR, Horace F., Brockton, Engineering.
PHILLIPS, Roger C., Boston, Chemistry.
PIERCE, Franklin P., Cambridge, Anthropology.
RUSSELL, Jeanne A., Arlington, Chemistry.
SCHMIDT, John P., Holyoke, Engineering.
STRAUS, Richard A., Revere, Engineering.
VOERTSCHER, Stefanie, Framingham, Social Sciences.

Postdoctoral

BAYM, Gordon A., Pittsfield, Physics.
HOOD, William B., Jr., Boston, Medical Sciences.

Senior Postdoctoral

Caldwell, David O., Cambridge, Physics.
Frisch, David H., Cambridge, Physics.
Gross, Eugene P., Waltham, Physics.
MOVIUS, HALLAM L., Jr., Cambridge, Anthropology.
POLLACK, Irwin, Cambridge, Psychology.
SHAFFT, Arnold S., Waltham, Mathematics.
TAWOOG, Betty M., Cambridge, Zoology.

Science Faculty

BAUMER, Phyllis A., Boston, Chemistry.
CLAYTON, Joe T., Amherst, Engineering.
GOLDSMITH, Oscar, Waltham, Mathematics.
LIGHT, Truman S., West Roxbury, Chemistry.
SCOTT, William T., Northampton, Physics.

Summer Fellowships for Graduate Teaching Assistants

ALPERIN, Jonathan L., Newton, Mathematics.
BOUTINIER, Robert F., North Andover, Earth Sciences.
BURKE, James J., Jr., Northampton, Chemistry.
DARMIERDOROSIAN, Ara H., Somerville, Chemistry.
FACTOR, Arnold, Mattapan, Chemistry.
KELLEHER, Catherine F., Medford, Chemistry.
KNEE, David L., Cambridge, Mathematics.
LEBER, Richard J., Thorndike, Mathematics.
MACKUN, Stanley, East Walpole, Social Sciences.
MANNIS, Fred, Brookline, Chemistry.
MILLEN, Mukay S., Boston, Zoology.
OYER, John W., Cambridge, Chemistry.
SAGAL, Matthew W., Brookline, Chemistry.
SAUL, Frank P., Cambridge, Anthropology.
WARD, Jeanné A., Arlington, Chemistry.
YATES, Robert A., Southbridge, Engineering.

Young, Nancy, Pittsfield, Genetics.

Summer Fellowships for Secondary School Teachers

ALVES, St. M. Menneic, Boston, Mathematics.
CRIGHTON, William A., Milton, Biology.
ECCLES, Frank M., Andover, Mathematics.
Falla, St. M. Anna, Brighton, Mathematics.
HONNEN, St. James F., Springfield, Biology.
KELLETT, Jeremiah J., Weston, Mathematics.
LANGER, Alan, Avon, Chemistry.
LUX, John R., Andover, Mathematics.
MCDONNELL, St. Immaculata, Worcester, Mathematics.
MCGARRY, St. M. Adria, Waltham, Chemistry.

Michigan

Graduate

ANDERSEN, Carl M., Richmond, Physics.
BACHMANN, Roger W., Ann Arbor, Zoology.
BALL, Richard J., Owosso, Psychology.
BALKARINI, David A., Iron Mountain, Physics.
BAYMA, Robert W., Detroit, Engineering.
BECK, William F., Lansing, Engineering.
BICHEL, Thomas F., Detroit, Mathematics.
BOYAN, Robert T., Milan, Physics.
BUTCHER, Samuel S., Gaylord, Chemistry.
BOYAN, Jon E., Detroit, Engineering.
BURSELL, Donald E., Detroit, Engineering.
CARR, Robert L., Mason, Biology.
CORNWELL, George W., Three Oaks, Zoology.
DE WITT, Calvin B., Ann Arbor, Zoology.
DEBERT, Max C., St. Johns, Engineering.
DUCMANIS, John A., Kalamazoo, Physics.
EDMONS, Kathern, Kalamazoo, Chemistry.

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MICHIGAN—Continued

EVELY, SUSAN J., Grosse Pointe, Mathematics.
FISCHER, PATRICK C., Ann Arbor, Mathematics.
FOX, KENNETH, Detroit, Physics.
FRAYER, DOROTHY A., Detroit, Biochemistry.
FRAYER, DOROTHY A., Detroit, Biochemistry.
GIQUIN, DONALD A., Detroit, Mathematics.
GIQUIN, DONALD A., Detroit, Mathematics.
GOODYEAR, JOHN M., Dearborn, Physics.
HUBER, LEE M., Plymouth, Chemistry.
KERR, JOHN P., Ann Arbor, Zoology.
KENDZIER, MARVIN, Grand Rapids, Chemistry.
LAZAROVI, CONDOB, Detroit, Mathematics.
LITWIN, GEORGE H., Detroit, Psychology.
MOSS, BARDA S M., Ann Arbor, Botany.
Owens, James C., Grosse Pointe, Physics.
PALMER, PAUL, Ann Arbor, Chemistry.
PAUL, ROBERT S., Niles, Zoology.
PIATKOWSKI, THOMAS F., Ann Arbor, Engineering.
POUTSMA, MARVIN L., Grand Rapids, Chemistry.
REINHARD, DOUGLAS N., Birmingham, Engineering.
ROBERTSON, WAYNE M., Fremont, Engineering.
ROSS, DAVID W., Detroit, Physics.
ROUSKIN, ARNOLD M., Ann Arbor, Engineering.
SLOBIN, DAN L., Detroit, Psychology.
SMITH, GENE E., Ann Arbor, Engineering.
SMITH, GENE E., Ann Arbor, Engineering.
SMITH, GENE E., Ann Arbor, Engineering.
SMITH, GENE E., Ann Arbor, Engineering.
SNIDER, ROBERT S., Niles, Zoology.
STREET, JAMES R., Detroit, Engineering.
TREADO, PAUL A., Ann Arbor, Physics.
VREECH, WILLIAM A., Pleasant Ridge, Mathematics.
WEBSTER, DALE A., Wyndotte, Biochemistry.
WEBSTER, ELIZABETH A., Detroit, Biochemistry.
WIDEMAN, JAMES M., Detroit, Medical Sciences.
WIGGERT, RICHARD G., Whitmore Lake, Zoology.
WISER, NATHAN, Detroit, Physics.
WOOD, RODNEY D., Charlotte, Engineering.
ZIER, ROBERT E., Detroit, Physics.

Cooperative Graduate
ALLARD, MARVEL J., Grosse Pte, Wood, Psychology.
ARCHBOLD, NOBERT L., Ann Arbor, Earth Sciences.
AUBERT, JOSEPH L., Lansing, Physics.
Baldwin, RANSOM L., East Lansing, Agriculture.
DAYS, KENNETH L., Shelby, Engineering.
BECK, JONATHAN M., Lansing, Mathematics.
BENKARD, JOHN P., Ann Arbor, Mathematics.
BROK, ROBERT S., Huntington Wood, Social Sciences.
BLASS, WILLIAM E., East Lansing, Physics.
BUCKMASTER, MARLIN D., Ann Arbor, Chemistry.

CLIFFORD, LEELAND T., Ann Arbor, Psychology.
CROS, DAVID V., Ann Arbor, Psychology.
DANIELS, EDWARD L., Grand Ledge, Engineering.
DEHART, DORIS L., East Lansing, Psychology.
DEON, DON C., Burlingame, Chemistry.
DUNGEY, RICHARD D. B., Pinckney, Zoology.
DUNN, ROBERT W., Farmington, Engineering.
FINNET, ROSS L., Ann Arbor, Mathematics.
FOULIS, LINDA M., Detroit, Mathematics.
FOULIS, DAVID A., Ann Arbor, Mathematics.
GARLAND, HOWARD, Oak Park, Mathematics.
GELLENBECK, ST. J. M., Detroit, Microbiology.
GRAUMAN, BOLLYN G., Birmingham, Engineering.
GREENBERG, DAVID L., Lansing, Zoology.
GULLAHORN, JEANNE E., East Lansing, Psychology.
HAAS, TERRY E., St. Johns, Chemistry.
HANNA, MARTIN S., Birmingham, Mathematics.
HARACE, RICHARD D., Dearborn, Physics.
HERS, CHARLES F., Dearborn, Social Sciences.
HOOG, GOTTFRIED, Detroit, Zoology.
HOOVER, ROBERT H., Saginaw, Physics.
HUANG, JUSTIN C., East Lansing, Physics.
HUNT, ROBERT H., Ann Arbor, Physics.
KERR, JOHN P., Ann Arbor, Zoology.
KNUDSEN, KARL G., Gwinn, Psychology.
KUSSMA, DENNIS C., Lincoln Park, Engineering.
LAPOINTE, CLAYTON W., Detroit, Engineering.
LINDMAN, HAROLD R., Dearborn, Psychology.
MAHON, JOHN L., North Muskegon, Engineering.
PATTERSON, DONALD J., Birmingham, Engineering.
PETERSON, RUTH A., Frankfort, Chemistry.
POULSEN, GAIL R., Norway, Chemistry.
ROSENFELD, ROBERT L., Jackson, Engineering.
SCHUMACHER, CLIFFORD R., Detroit, Physics.
SCHWARZ, ALAN S., Detroit, Engineering.
SHEETER, STARWIN, G., Ann Arbor, Botany.
SILBER, RICHARD F., Benton, Physics.
SMITH, GLEN C., Morenci, Engineering.
SPEARE, NEAL M., Ann Arbor, Mathematics.
STEVENSON, ALFRED L., Brown City, Engineering.
STREET, DAVID P., Ann Arbor, Social Sciences.
TAMSAND, THOMAS R., East Lansing, Psychology.
VANDYKE, JOHN W., Jr., Holland, Chemistry.
WADDELL, JOHN H., East Lansing, Psychology.
WARD, EDWARD R., Ann Arbor, Biochemistry.
WILSON, CAROL M., Detroit, Chemistry.
WOLFSRY, WAYNE C., Battle Creek, Chemistry.
ZERWA, ROSE D., Ferndale, Physiochemistry.

Postdoctoral
BROWN, MORTON, Ann Arbor, Mathematics.
CARLSON, EDWARD H., Lansing, Physics.
CLOSSON, WILLIAM D., Poultic, Chemistry.
DAVENPORT, RICHARD, Battle Creek, Zoology.
SCHLEINGER, MELVIN J., Ann Arbor, Biochemistry.


Senior Postdoctoral
ALLER, LAWRENCE H., Ann Arbor, Astronomy.
BANDURSKY, ROBERT S., East Lansing, Biochemistry.
BERNSTEIN, RICHARD E., Ann Arbor, Physics.
CHAVIN, WALTER, Detroit, Zoology.
DEWITT, ERICH E., Ann Arbor, Genetics.

Science Faculty
BRIDGMAN, ROBERT J., Ypsilanti, Mathematics.
CARSON, RALPH S., Holland, Engineering.
CAZAK, STANLEY J., Detroit, Astronomy.
DARBY, HENRY A., Detroit, Engineering.
DUFFY, ALAN L., Grand Rapids, Botany.
HAAS, VIOLET, Detroit, Mathematics.
HEDGES, HARRY G., East Lansing, Engineering.
KEVIN, Sr. M. ALICIA, Detroit, Mathematics.
KOLLER, WILLIAM A., Ann Arbor, Botany.

Summer Fellowships for Graduate Teaching Assistants
ALLARD, MARVEL J., Grosse Pointe Woods, Psychology.
BORCHERTS, ROBERT H., Ann Arbor, Engineering.
BOYD, JOHN W., East Lansing, Physics.
BRAGG, ARTHUR E., Ann Arbor, Mathematics.
CALHOUN, ROLAND L., Ann Arbor, Psychology.
DAUGHERTY, NED A., East Lansing, Chemistry.
DAVIS, JAMES H., East Lansing, Psychology.
DAVIES, DONALD L., Zeeland, Chemistry.
DUBBES, RICHARD C., East Lansing, Engineering.
HALPERN, JAMES D., Detroit, Mathematics.
HOOVER, WILLIAM G., Ann Arbor, Chemistry.
KAPLAN, STEPHEN, Ann Arbor, Psychology.
KORNFREY, ROBERT R., Ann Arbor, Mathematics.
LEININGER, WILLIAM J., Marquette, Social Sciences.
LOUTTIT, RICHARD T., Ann Arbor, Psychology.
MAHNEY, HINRICH R., East Lansing, Engineering.
MAYER, VICTOR E., East Lansing, Chemistry.
MOHR, JERRY G., Grand Rapids, Chemistry.
NOMOAL, NANCY G., Ann Arbor, Biochemistry.
OHMANN, JAMES Y., Jr., Ann Arbor, Medical Sciences.
PALMER, LIBBY, Ann Arbor, Mathematics.
PHILLIPS, BARBIE M., Jackson, Medical Sciences.
SCHWARTZ, ARTHUR J., Detroit, Mathematics.
SEBASTIAN, LOIS P., Ann Arbor, Psychology.
TRABASSO, THOMAS R., East Lansing, Psychology.
WALDEN, MARVIN E., Troy, Mathematics.
WIRTH, JOHN L., Three Oaks, Engineering.

Summer Fellowships for Secondary School Teachers
BAUER, ERNEST A., Grosse Pointe, Mathematics.
COMIKEY, ST. JEAN K., Utica, Biology.
CONVERSE, ST. M. JR., DARC, Grand Rapids, Biology.
HAGIE, DAVID L., Mason, Biology.
HAM, JOHNN E., Grand Rapids, Biology.
HARMON, MOH, MARIELLENS, Grosse Poinle, Chemistry.
HARTSTEIN, JOHN L., Niles, Biology.
KOHLEPP, JOHN ALAM, Flint, Mathematics.
LABATT, DEE W., Mendon, Biology.
LODET, CHARLES E., Flint, Mathematics.
MANDOSIBAN, ADRIENNE, Detroit, Botany.
MATHON, WILLIAM E., Montague, Biology.
MICHIELS, EOS. CIILIO LEO, Detroit, Chemistry.
MOORE, CALVIN V., Detroit, Zoology.
MULLINIX, DANIEL D., Wayne, Biology.
NYGARD, VERNON D., Muskegon, Mathematics.
PHILLIPS, GENE A., Corunna, Mathematics.
RAKOTZ, ST. M. ANDREAE, Hamtramck, Chemistry.
REILLY, JERRY L., Ann Arbor, Biology.
SMYTKA, JOHN M., Jr., Detroit, Biology.
SUSSMANN, RALPH S., Belding, Engineering.

MINNESOTA
Graduate
ARNESON, RICHARD M., Minneapolis, Zoology.
BERG, JOHN C., Hopkins, Engineering.
CONE, RICHARD A., St. Paul, Physics.
DARLIE, JOHN L., Minneapolis, Psychology.
DEUTSCH, CRAIG W., Minneapolis, Chemistry.
DICKELMAN, THEODORE E., Minneapolis, Chemistry.
EFRON, BRADLEY, St. Paul, Mathematics.
FRIEDSH, BERT E., Hopkins, Mathematics.
GAMBLE, THEODORE W., Robbinsdale, Mathematics.
KIRCHNER, ROGER S., Edina, Mathematics.
LOWRY, THOMAS H., Minneapolis, Chemistry.
McKINNON, DOUGLAS H., Minneapolis, Anthropology.
MOFFET, ALAN T., Rochester, Astronomy.
NABWJICTH, ROBERT W., Minneapolis, Mathematics.
OLSON, EDWIN S., Cannon Falls, Chemistry.
ORTHE, CARL M., Jr., McIntosh, Mathematics.
PIKERT, ERNEST W., Minneapolis, Earth Sciences.
RENSHINE, MARVIN E., Austin, Physics.
SOUTHWICK, DAVID L., Rochester, Earth Science.
SPANGLER, JOHN D., Atwater, Physics.
SWANSON, STANLEY M., St. Paul, Physics.
SYVerson, MYRON W., Minneapolis, Mathematics.
TADER, ST. RITA J., St. Paul, Mathematics.
THURNAUER, PETER G., St. Paul, Physics.
TORGERSON, RALDON T., Minneapolis, Physics.
WHITI, ROSELYE B., Minneapolis, Physics.
WILDE, STEPHEN E., Minneapolis, Engineering.
WILLET, ROGER D., Northfield, Chemistry.

Cooperative Graduate
BENT, ANNE M., Minneapolis, Botany.
CAHON, ELIZABETH J., Minneapolis, Botany.

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MINNESOTA—Continued

CARLSON, ROBERT L., Duluth, Chemistry.
CLAYTON, LEON S., Lockhart, Earth Sciences.
CONTOS, RICHARD F., Duluth, Microbiology.
DAWES, CLINTON J., Robbinsdale, Botany.
DUBBEER, PAUL L., Moorhead, Mathematics.
FULLMORE, JAY F., Minneapolis, Mathematics.
FLYNN, PATRICK F., Regal, Engineering.
GAUSTAD, JOHN E., Minneapolis, Astronomy.
HAIGHT, CHARLES H., Minneapolis, Engineering.
HERD, ALAN E., St. Paul, Physics.
HELLING, ROBERT B., Madelia, Genetics.
JOHNSON, DONALD C., St. Paul, Chemistry.
JOHNSON, RICHARD R., Minneapolis, Psychology.
JOHNSON, WILLIAM W., Minneapolis, Genetics.
JONES, DUANE A., Northfield, Chemistry.
KENNAN, JOHN R., St. Paul, Chemistry.
KONCOS, ROBERT, Minneapolis, Chemistry.
MAHER, LOUIS J., Jr., Minneapolis, Earth Sciences.
OAKES, THOMAS R., Minneapolis, Chemistry.
OREL, PATRICK J., Stillwater, Chemistry.
RANZ, NEVILLE W., Jr., Minneapolis, Physics.
REITER, RUSSELL J., Cold Spring, Medical Sciences.
RICE, RICHARD R., New Ulm, Physics.
SCHANZER, LARRY L., Minneapolis, Chemistry.
SOMMER, DAVID C., St. Paul, Mathematics.
VANLINN, ALAN E., Austin, Chemistry.
YAPEL, ANTHONY E., Jr., Soudan, Chemistry.

Postdoctoral

MUELLER, AUGUST F., Mahnomen, Microbiology.

Senior Postdoctoral

SITZER, FRANK L., Minneapolis, Mathematics.
YENNIN, DONALD R., Minneapolis, Physics.

Science Faculty

RAMMETTE, RICHARD W., Northfield, Chemistry.
RUDD, MILLARD E., Moorhead, Physics.
WOLF, FRANK L., Northfield, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

DOMHOLDT, LOWELL C., Minneapolis, Engineering.
DUBBEE, PAUL L., Moorhead, Mathematics.
EMERSON, KENNETH, Minneapolis, Chemistry.
HELLING, JOHN F., Madelia, Chemistry.
HEUER, CHARLES V., Bertha, Mathematics.
JOHNSON, DONALD C., St. Paul, Chemistry.
JONES, DUANE A., Northfield, Chemistry.
LARSON, HOMER R., Pelican Rapids, Zoology.
PHORDE, DONALD E., Fairmont, Chemistry.
KIET, JAMES W., Detroit Lakes, Engineering.
SASHER, DUANE F., Minneapolis, Mathematics.
SCHLAGER, LARRY L., Minneapolis, Chemistry.
SILVERMAN, WILLIAM, Minneapolis, Mathematics.
STORMS, HOWARD A., Ada, Chemistry.

Summer Fellowships for Secondary School Teachers

ACQUARD, RICHARD H., Austin, Mathematics.
COULTER, JOHN C., Mond, Biology.
DINGLE, JAMES H., Elk River, Mathematics.
HAYDEN, LYLE J., Pelican Rapids, General Science.
HENDRICKSON, ARTHUR D., Tower, Mathematics.
HITI, LUDWIG F., Cloquet, Mathematics.
OLSON, ALLAN L., South St. Paul, Mathematics.
PRAUS, HOWARD LEE, Mankato, Mathematics.
SCHROEDER, DENNIS S., Waseca, Chemistry.
THIBIS, ST., JEAN M., Wabasha, Biology.
VAN LOON, RUSSELL J., Robbinsdale, Mathematics.

MISSISSIPPI

Graduate

BALGORD, WILLIAM D., Jackson, Earth Sciences.
CERNY, JOSEPH III, University, Chemistry.
NAMKOON, GENE, Gulfport, Genetics.

Cooperative Graduate

BARTETT, CARL R., Jr., Jackson, Engineering.
BRADLOW, JUDITH M., University, Chemistry.
BUNNING, ROBERT R., Gulfport, Engineering.
CARTER, BEN McCULLOCH, Billy J., Jackson, Social Sciences.
FAGOT, HACKER J., Pass Christian, Psychology.
FITCH, DAVID C., Gulfport, Engineering.
GILMER, ROBERT W., Jr., Pontotoc, Mathematics.
HOLLINSWORTH, JOHN G., Decatur, Mathematics.
MANSEFIELD, CLIFTON T., Winona, Chemistry.
POUNTS, DONNIE J., Bonneville, Engineering.
RUSSELL, LYNNE D., Pontotoc, Engineering.
WALLOCK, EARL T., Grenada, Chemistry.

Postdoctoral

DAVIS, JAMES E., State College, Biochemistry.

Science Faculty

AYEN, RUSSELL E., University, Engineering.
BLAKNET, SIMMIE S., Waynesboro, Mathematics.
MCKEIE, WILL T., Jr., State College, Engineering.

Summer Fellowships for Graduate Teaching Assistants

BROAD, JUDITH M., University, Chemistry.
BRYAN, EDWARD E., Oxford, Chemistry.
LEWIS, JOHN T. III, Jackson, Psychology.
MCCONE, ELINOR J., Vicksburg, Genetics.

Summer Fellowships for Secondary School Teachers

AUSTIN, GLADYS, Meridian, Biology.
BROOK, GRACE B., Jackson, General Sciences.
DANIEL, ARMY, Jr., Jackson, General Sciences.
GOODGAME, LUCILE H., Laurel, Mathematics.
JONES, DOROTHY LOUISE, Canton, Biology.
LEWIN, ROBERT L., Hattiesburg, Microbiology.
LEWIS, RUTH TODD, Okolona, General Sciences.
TILLMAN, MARGARET H., Bruce, General Sciences.

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WILSON, WILLIAM RAY, Port Gibson, Mathematics.

MISSOURI

Graduate

ANDREWS, JAMES S., Columbia, Psychology.
BENSON, EDWARD J., St. Louis, Engineering.
BERRY, RAYMOND W., Kansas City, Mathematics.
BRENNER, ROBERT C., Rolla, Chemistry.
BRUCKER, WILLIAM H., Jr., Clayton, Geology.
BRÜCKNER, HERMANN, St. Louis, Mathematics.
BROWN, CHARLES J., Steelville, Earth Sciences.
BULL, CHARLES F., Joplin, Chemistry.
BUSE, RALPH C., St. Louis, Engineering.
CAMPBELL, CHARLES J., Joplin, Chemistry.
CANDLER, BEVERLY, St. Louis, Engineering.
CANTWELL, DOUGLAS, St. Louis, Engineering.
CANTWELL, JOHN C., University City, Mathematics.
CARTER, WILLIAM, Kansas City, Chemistry.
CARTWRIGHT, DONALD F., St. Louis, Physics.
CARR, ALFRED R., Kansas City, Chemistry.
CARR, WILLIAM H., Jr., Cape Girardeau, Chemistry.
CARRINGTON, THOMAS E., St. Louis, Mathematics.
CARRINGTON, WILLIAM H., Jr., Cape Girardeau, Chemistry.
CARRILO, RAYMOND, St. Louis, Engineering.
CARRILO, ROBERT, St. Louis, Engineering.
CARRY, WILLIAM, Joplin, Chemistry.
CASH, RALPH, St. Louis, Chemistry.
CASH, WILLIAM, St. Louis, Chemistry.
CATHER, ANTHONY, St. Louis, Mathematics.
CATT, WILLIAM H., Jr., Cape Girardeau, Chemistry.
CAYTON, WALTER, St. Louis, Engineering.
CECIL, RALPH, St. Louis, Engineering.
CERON, JOSEPH, St. Louis, Chemistry.
CHEATUM, RAYMOND, St. Louis, Engineering.
CHEN, CHAO CHUAN, St. Louis, Mathematics.
CHEN, CHENG, St. Louis, Chemistry.
CHEN, CHUNG CHI, St. Louis, Mathematics.
CHEN, CHUNG KUN, St. Louis, Mathematics.
CHEN, CHUN J., St. Louis, Chemistry.
CHEN, WEI CHIANG, St. Louis, Chemistry.
CHEN, WEN, St. Louis, Chemistry.
CHEN, WEN K., St. Louis, Chemistry.
CHEN, WEN K., St. Louis, Chemistry.
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CHEN, WEN K., St. Louis, Chemistry.
CHEN, WEN K., St. Louis, Chemistry.
CHENG, KEN SHENG, St. Louis, Mathematics.
CHRISTENSEN, LAURENCE, St. Louis, Engineering.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
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CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
CINDRINE, WILLIAM F., St. Louis, Mathematics.
MISSOURI—Continued

HIX, ST. PATRICIA M., St. Louis, Mathematics.
HOGER, CHARLES E., St. Louis, Zoology.
MAGRUDER, WILLIS J., Kirksville, General Science.
MCCOLLUM, ST. M. AUSTIN, St. Louis, Biology.
MORRIS, MARY E., Webster Groves, Mathematics.
OSCHWALD, RICHARD A., Maryville, Mathematics.
PARKER, JOHN DOYLE, Herculaneum, Biology.
YARBOROUGH, WILLIS J., Kirksville, General Sciences.
McCosdrey, Sr. M. AUINNA, St. Louis, Biology.
MONroe, MAXX E., Webster Groves, Mathematics.
O'SULLIVAN, RICHARD A., Maryville, Mathematics.
PARKER, JOHN DOYLE, Herculaneum, Biology.
Piper, Cornell David, Webster Groves, Mathematics.
SPINN, ST. M. EDWARD PAUL, St. Louis, Chemistry.
Tocher, Sr. MARGARET E., St. Louis, Biology.
WATSON, ROBERT N., Ferguson, Biology.
Yeates, GEORGE IRVIN, Maryville, General Sciences.

MONTANA

Graduate

BICEBERT, LLOYD G., Billings, Engineering.
CAlVERT, JAMES R., Billings, Physics.
VINCETT, RICHARD R., Billings, Earth Sciences.
WOODWARD, LEE A., Missoula, Earth Sciences.

Cooperative Graduate

DECKERT, KENNETH L., Richfield, Mathematics.
FRITZ, RAYMOND R., Bozeman, Engineering.
HILL, JAMES R., Livingston, Engineering.
LIEBRAND, ROGER J., Bozeman, Chemistry.
MANTIS, MERRELL E., Missoula, Mathematics.
McRAE, DANIEL G., Missoula, Mathematics.
MITCHELL, WILLIAM W., Roundup, Botany.
PARKER, RONALD C., Missoula, Earth Sciences.
SWENSON, RONALD J., Bozeman, Physics.
VANHORN, SARALEE N., Lewistown, Zoology.
Yale, ERIK K., Missoula, Mathematics.

Science Faculty

BROOKE, WILLIAM E., Bozeman, Botany.
HOTZ, BERNARD W., Bozeman, Engineering.

Summer Fellowships for Secondary School Teachers

COYLE, ST. PAUL J., Butte, Mathematics.
LIPLET, JOHN G., Fort Benton, Biology.
SHEFFNER, ST. M. LUCIANA, Ashland, Biology.

NEBRASKA

Graduate

ALLINGTON, ROBERT W., Lincoln, Engineering.
ANDERSON, JOHN F., Omaha, Mathematics.
CASEBROOK, DAVID G., Ainsworth, Physics.
JONES, NOEL D., Hastings, Chemistry.
KNOTTER, ALISON A., Palsade, Mathematics.
MCARTHUR, DONALD E., Atlanta, Physics.
SHURT, ELDON W., Lincoln, Biochemistry.
WHEAT, MARY L., Hastings, Mathematics.
WITTE, ALFRED H., Lincoln, Engineering.

Cooperative Graduate

BOLAR, MARVIN L., Lincoln, Botany.
ERICKSON, LARRY E., Wahoo, Engineering.
GROSS, MILLER L., Lincoln, Mathematics.
KELLY, THOMAS P., Omaha, Mathematics.
LANG, WAYNE W., Lincoln, Physics.

PARK, JOHN T., Lincoln, Physics.
SWANSON, JAMES A., Lincoln, Chemistry.

Science Faculty

HANSEN, PAUL V., Jr., Blair, Chemistry.
MARLETTE, RALPH R., Lincoln, Engineering.

Summer Fellowships for Graduate Teaching Assistants

ELIHARTY, EUGENE D., Hastings, Zoology.

Summer Fellowships for Secondary School Teachers

ADAMS, NICK L., Beaver City, Biology.
ALBERDEING, ARTHUR P., Jr., Ord, Mathematics.
GROOS, Sr. M. STEPHANUS, Fremont, Biology.
HEFFNER, Sr. M. CLARETTA, Greeley, Chemistry.
HEISER, MARION S., Omaha, Mathematics.
JOHNSON, DONALD B., Omaha, Mathematics.
STONES, IAN D., Morrill, Mathematics.
VANOTE, BENJAMIN, Holdrege, Biology.

NEVADA

Graduate

SHANKLAND, THOMAS J., Boulder City, Physics.
SIBBALD, GARRETT H., Reno, Social Sciences.

Cooperative Graduate

CROOK, JOSEPH E., Sparks, Chemistry.
HILL, FREDERICK J., Boulder City, Engineering.

Summer Fellowships for Graduate Teaching Assistants

CROOK, JOSEPH E., Sparks, Chemistry.
WIRE, WILLIAM S., Carson City, Earth Sciences.

Summer Fellowships for Secondary School Teachers

ANDERSON, HOWARD V., Hawthorne, Mathematics.
STREIB, BOB FARNELL, Las Vegas, Biology.

NEW HAMPSHIRE

Graduate

KING, ROBERT B., Rochester, Chemistry.
MARSHALL, ALAN C., Laconia, Engineering.
ROBINSON, PETE, Hanover, Earth Sciences.
WILLIAMS, DONALD J., Jaffrey, Physics.

Cooperative Graduate

BARD, EARL F., Manchester, Biology.
KIMBALL, RICHARD M., Greenville, Engineering.
O'MALLEY, ROBERT E., Jr., Somersworth, Mathematics.

Science Faculty

TUTTLE, ELIZABETH R., Conway, Astronomy.
ZEYIS, NICHOLAS, Manchester, Chemistry.
ZIMMERMAN, CARL E., Jr., Laconia, Engineering.

Cooperative Graduate

BARD, EARL F., Manchester, Biology.

Summer Fellowships for Graduate Teaching Assistants

BEARDON, RICHARD L., Nashua, Zoology.
GILMAN, RICHARD A., Concord, Earth Sciences.
Summer Fellowships for Secondary School Teachers

COSTELLO, Sr., M. BEATRICE, Manchester, Biology.
Pellenier, Sr., MARIE C., Hudson, Biology.

NEW JERSEY

Graduate

Ally, Jane E., Stanford, Psychology.
Barth, Robert H., Jr., Ridgewood, Zoology.
Bennett, James H., Princeton, Mathematics.
Bennett, Robert A., Leona, Earth Sciences.
Brant, David A., Summit, Chemistry.
Brault, James W., Princeton, Physics.
Calwell, Dennis J., Fennes Grove, Geography.

Carle-Smith, James M., Summit, Psychology.
Chaiten, Jan M., Rahway, Physics.
Cowburn, Stephen P., Summit, Biochemistry.
Cohen, William D., Weehawken, Zoology.
Condron, Paul E., Princeton, Physics.
Conrad, Peter W., East Rutherford, Engineering.
Davis, Brian T., Princeton, Earth Sciences.
Fahney, David E., Fort Lee, Biochemistry.
Friedman, Kenneth A., Highland Park, Physics.
Gluck, Herman B., Princeton, Mathematics.
Graf, Ronald E., Passaic, Physics.
Griswold, Newcomb, Short Hills, Mathematics.
Griepen, David H., Oakland, Botany.

Graduate

Hall, Daniel N., Princeton, Chemistry.
Hand, Brian M., Jersey City, Earth Sciences.
Hays, James P., Short Hills, Earth Sciences.
Holewarth, George M., Westfield, Biophysics.
Huber, David L., Tom's River, Physics.
Johnson, Joseph L., Jr., Upper Montclair, Mathematics.
Kaynew, Robin J., Lakewood, Physics.
Keenan, Edward M., East Orange, Mathematics.
Kendall, John G., Point Pleasant, Physics.
Koch, John F., Oakhurst, Physics.
Kover, Warner B., Rochelle Park, Chemistry.
Kowal, Norman E., Rochelle Park, Botany.
Kowal, Robert B., Rochelle Park, Botany.
Kuh, Richard E., Princeton, Physics.
Larsen, David M., Hawthorne, Physics.
Mather, William B., Jr., Princeton, Chemistry.
Merrill, Deane W., Jr., South Orange, Physics.
Millman, Michael G., Summit, Physics.
Mollon, Benjamin R., Union, Physics.
Ohl, Rosemary P., Madison, Engineering.
Pilla, Michael A., Trenton, Engineering.
Pollock, William A., Lincoln Park, Engineering.
Richter, Wayne H., Leonia, Mathematics.
Seybold, Paul G., Collingswood, Physics.
Silvers, Stuart J., South Orange, Biochemistry.
Sowers, Ojars J., Princeton, Chemistry.
Stevens, Richard M., Audubon, Chemistry.
Tartak, Olen J., Passaic, Engineering.
Vilms, Uri, Seabrook, Engineering.
Waldron, Sidney R., Ringwood, Anthropology.

Cooperative Graduate

Abraham, Barbara W., Madison, Physics.
Beaden, Robert T., Princeton, Physics.
Buntan, Mary W., Highland Park, Mathematics.
Campbell, Neil C., Teaneck, Engineering.
Cann, Ross B., Ridgewood, Earth Sciences.
Chambers, Leonard S., Fennes Grove, Mathematics.
Cohen, Edward M., East Orange, Chemistry.
Damaro, Anne, Jersey City, Mathematics.
DeDominicis, Alex J., Union City, Chemistry.
Doughty, Kay M., Indian Mills, Chemistry.
Feders, Robert F., Bayonne, Chemistry.
Gerrish, John B., Orange, Engineering.
Gill, Helen K., West Englewood, Biochemistry.
Gold, Harry S., Pennington, Engineering.
Goodwin, Elizabeth B., Hopewell, Psychology.
Halpern, Gerald M., Jersey City, Physics.
Hernan, Michael S., Newark, Engineering.
Hopkins, Paul D., Wemah, Chemistry.
Hutchinson, John W., Bridgeport, Engineering.
Jefferson, James W., Westwood, Medical Sciences.
Jones, William R., Haddon Heights, Mathematics.
Kosobuch, Robert M., Haddonfield, Engineering.
Laurie, Robert C., Maywood, Zoology.
Mingi, Richard H., Clifton, Engineering.
Muller, Robert A., Rutherford, Earth Sciences.
Murphy, James J., River Edge, Physics.
Nishimura, Ruth, New Brunswick, Psychology.
O'Neill, John J., Jersey City, Chemistry.
Pepper, Stephen V., Margate City, Physics.
Pert, Clark W., Ridgewood, Chemistry.
Poage, James F., Morristown, Engineering.
Rieger, Philip H., Teaneck, Chemistry.
Rosenthal, Eli, Newark, Chemistry.
Roth, Shirley L., Lakewood, Chemistry.
Sitchik, Jerold A., Merchantville, Physics.
Silvestri, Anthony J., Glassboro, Chemistry.
Smith, Donald E., Bergenfield, Chemistry.
Tunnel, Robert E. L., Montclair, Mathematics.
Vill, John J., Highland Park, Chemistry.
Will, Theodore A., Montclair, Physics.
Wimb, Cynthia C., New Brunswick, Psychology.
Wormser, Henry C., Vineland, Chemistry.
Wright, Richard T., Haddonfield, Biology.

Postdoctoral

Dheerens, Robert N., New Vernon, Mathematics.
Kimmel, Donald L., Jr., Woodbury, Medical Sciences.
Shuster, Charles W., Glen Rock, Biochemistry.
Skalak, Richard, Leonia, Engineering.

Senior Postdoctoral

Stix, Thomas H., Princeton, Physics.

Science Faculty

Fanale, Louisa P., East Orange, Medical Sciences.
Hoyes, Horst W., Lake Hiawatha, Biophysics.
NEW JERSEY—Continued

SCOTT, DONALD A., Madison, Chemistry.
SLAET, STEVE M., Princeton, Engineering.
WHITE, MYRON E., Hoboken, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BECKER, DOROTHY G., Rahway, Mathematics.
CAMPBELL, NEIL C., Teaneck, Engineering.
CHARLAP, LEONARD S., Penns Grove, Mathematics.
DREITZ, ROBERT J., New Brunswick, Zoology.
DUKONZ, ART, Prospect Park, Chemistry.
FORREST, HELEN F., Upper Montclair, Zoology.
FRANKE, CHARLES H., Bloomfield, Mathematics.
FRIEDMAN, EDWARD A., Bayonne, Physics.
GIBSON, DANIEL M., Jr., Trenton, Engineering.
HOPKINS, PAUL D., Wenonah, Chemistry.
HORROCKS, WILLIAM D., JR., Moorestown, Chemistry.
KALLENBACH, VINCENT R., West New York, Chemistry.
KOWAL, NOBMAN E., Rochelle Park, Botany.
KUHN, PAUL 0., JR., Delanco, Mathematics.
KUPDLIN, ROBERT H., Bridgeton, Botany.
MACDONNELL, THOMAS K., Los Alamos, Physics.
MUNSON, DIANA H., Las Cruces, Zoology.
NEWMAN, DAVID S., Albuquerque, Mathematics.
POORBAUGH, EDMUND B., Santa Fe, Zoology.
SCHOEN, 'SIR. M. MYRON, North Plainfield, Chemistry.
SMITH, ROBERT, North Plainfield, Mathematics.
WALDBERG, JAMES T., Los Alamos, Engineering.

NEW MEXICO

Graduate

BERGSTRESSER, THOMAS K., Los Alamos, Physics.
BIRDSYE, ROBERT E., Los Lunas, Physics.
DOWDLE, JOHN R., Deming, Mathematics.
LUNSFORD, JAMES S., Albuquerque, Engineering.
ROEDER, DAVID W., Albuquerque, Mathematics.
WALKER, JOSEPH M., Santa Fe, Biochemistry.

Cooperative Graduate

DIAZ, RAYMOND H., Sandia Base, Engineering.
MUNSON, DIANA H., Las Cruces, Zoology.
NEWMAN, DAVID S., Albuquerque, Mathematics.
POORBAUGH, EDMUND B., Santa Fe, Zoology.
WILLIAMS, FRANK M., University Park, Mathematics.

Summer Fellowships for Secondary School Teachers

BONHAGEN, FREDERICK H., Santa Fe, Mathematics.
CLEEKS, NATHAN H., Sr., Hagerman, Mathematics.
McCRAY, OLLIE W., Sliver City, Botany.
MITCHELL, ROBERT C., Anthony, Physics.

NEW YORK

Graduate

ALF, CYNTHIA E., Long Island City, Physics.
AMOROSO, MICHAEL J., flushing, Physics.
ANDERSON, CHARLES H., Briarcliff Manor, Physics.
ABENDU, DONALD, New York, Physics.
AUBEN, HENRY E., New Rochelle, Biochemistry.
BARAFF, GENE A., Elmhurst, Physics.
BARTLETT, DAVID D., New York, Physics.
BATT, RUSSELL H., Jamestown, Chemistry.
BATTERMAN, STEVEN C., Brooklyn, Engineering.
BECK, BERNARD, Bronx, Social Sciences.
BOGGE, ROBERT, FREEPORT, Engineering.
BLOOM, DAVID M., New York, Mathematics.
BOYLAN, EDWARD S., New York, Mathematics.
BRANCACIO, PETER J., Long Island City, Engineering.
BRASIL, MICHAEL, Troy, Engineering.
BRUSH, JOAN O., Sidney, Chemistry.
BUHLER, CARL F., Hempstead, Chemistry.
BUFORD, MARTIN, Brookllyn, Engineering.
CAMPBELL, VERN, Patchogue, Anthropology.
CASSIDY, KENNETH P., Jackson Heights, Mathematics.
COHUN, NATALIE S., Floral Park, Medical Sciences.
CONN, ALBERT A., Shrub Oak, Physics.
CONN, CAROLYN, Syracuse, Chemistry.
CONRATH, DAVID W., Rye, Social Sciences.
COTTLER, RUMA J., Brooklyn, Zoology.
DAWSON, ROBERT L., Rochester, Chemistry.
DEBBAU, RALPH, Far Rockaway, Chemistry.
DOBY, RICHARD, New York, Physics.
DOUGHERTY, HARRY W., Brooklyn, Sociology.

DRISCOLL, MICHAEL J., Buchanan, Engineering.
DROWIN, LOWELL, Brooklyn, Physics.
DUNTON, PAUL D., New York, Physics.
DUBOS, GEORGE, B., Jr., Carle Place, Engineering.
DUNST, MARY E., Brooklyn, Zoology.
DURAND, JAMES G., Jr., Elmira, Engineering.

EASTON, PAUL D., New York, Engineering.
EBERHART, WALTEB, Jamaica, Physics.
EGELS, JOAN C., Malverne, Earth Sciences.
EINSTEIN, ALBERT A., Shrub Oak, Physics.
EKLUND, DANIEL A., Troy, Geography.
EPPES, CHARLES R., Brooklyn, Engineering.
ESLICK, ARTHUR E., New York, Engineering.
EVANS, LUCY M., Williamsville, Chemistry.
FELDMAN, MARTIN, Brooklyn, Physics.
FINE, TERENCE L., New York, Engineering.
FROEM, JACK H., Brooklyn, Chemistry.
GALLANT, JONATHAN A., Mount Vernon, Engineering.
GARLEMANN, HERBERT M., Far Rockaway, Physics.
GEMFORD, HAROLD, Brooklyn, Social Sciences.

GEORGE, ALBERT R., Jr., Carle Place, Engineering.
GILBERT, IBA H., Jamaica, Physics.
GINSBERG, EDWARD S., New York, Physics.
GOLDBERG, CHARLES H., Brooklyn, Mathematics.
GOLUB, ROBERT, New York, Physics.
GRANFEL, SARAH F., Brooklyn, Microbiology.
GREY, RICHARD J., Johnson City, Engineering.
GREENBERG, ARTHUR E., New York, Engineering.
GROSS, LUCY M., Williamsville, Chemistry.
GROSS, KURT E., Cortlandt Hudson, Anthropology.
GUNNER, ERNEST, Brooklyn, Physics.
HALDRE, ALVIN M., Bronx, Physics.
MASON, PAUL, Queens, Mathematics.
MAYERS, ROBERT A., Mount Vernon, Physics.

HARRISON, DAVID R., North Tonawanda, Physics.
HARRIS, CHARLES S., Great Neck, Long Island, Psychology.
HECKEL, PHILIP H., Rochester, Earth Sciences.
HERSON, CARL P., Snyder, Biochemistry.
HERZOG, STANLEY, New York, Engineering.
HILL, CHARLES G., Jr., Elmsford, Engineering.
HUFF, MARCIA A., Jr., Rochester, Engineering.
HULTMAN, ERIC, Bronx, Zoology.
HULTMANN, ALFRED G., Woodside, Chemistry.
ISAACS, I. M., Bronx, Mathematics.
KAM, DANIEL S., Brooklyn, Mathematics.
KAM, PETER J., Forest Hills, Mathematics.
KAM, ROBERT E., Flushing, Engineering.
KAPLAN, LEONARD, Bronx, Zoology.
KARO, GEORGE E., New York, Chemistry.
KENDALL, ROBERT L., Rochester, Zoology.
KERRISON, JOHN F., St. Albans, Mathematics.
KORENMAN, VICTOR, Brooklyn, Physics.
KRANTZ, DAVID H., Buffalo, Psychology.
KRIEGES, JEROME E., Brooklyn, Physics.
KRIPKE, BERNARD R., Scarsdale, Mathematics.
KURIS, JOSEPH J., Brooklyn, Physics.
LAMPORT, LESLIE B., New York, Mathematics.
LAMPSON, OSCAR E. III, New York, Physics.
LARABEE, ALLAN R., Great Neck, Biochemistry.
LEHMANN, JEROME A., Mount Vernon, Chemistry.
LEVY, JEROME H., Mount Vernon, Chemistry.
LEVY, PETER M., New York, Engineering.
LEWIN, RUTH F., New York, Chemistry.
LICHTHAUM, STEPHEN, Brooklyn, Mathematics.
LIEBLING, GERALD R., Brooklyn, Chemistry.
LOWENTHAL, FRANKLIN, New York, Physics.
LYUBIN, SAUL, Brooklyn, Mathematics.
LUBRIDGE, EUGENE M., Brooklyn, Mathematics.
LYNCH, BEN E., Horseheads, Physics.
MACGONAL, RALPH M., Rego Park, Chemistry.
MARIANO, CHARLES F., Long Island City, Physics.
MASTERS, MILICENT R., Flushing, Biochemistry.
MAYERS, ALAN L., Flushing, Mathematics.
MCLEOD, DONALD W., Ithaca, Physics.
MEININGHAUS, ARLENE R., Lancaster, Chemistry.
MEYER, WERNER F., Bronx, Mathematics.
MOSK, PAUL, Queens, Mathematics.
MYERS, ROBERT A., Mount Vernon, Physics.
NIELSON, ROBERT K., Buffalo, Physics.
NICOL, MALCOLM E., Briarcliff Manor, Chemistry.
OFFENHARZ, PETER O., Bronx, Chemistry.
PALKO, JOHN R., Jackson Heights, Zoology.
PANKIWISKYJ, KOST A., Larchmont, Earth Sciences.
PARSEGIN, VOZEV A., Troy, Biophysics.
PASSMAN, DONALD S., Bronx, Mathematics.
PEDERSEN, CHARLES R., Brooklyn, Engineering.
PHELTON, SAM, Brooklyn, Social Sciences.
PENNISTEN, JOHN W., Kenmore, Mathematics.
PERRIN, ROBERT F., New York, Physics.
POLLACK, JAMES B., Woodmere, Long Island, Physics.
REYNOLDS, BRO. JOSEPH, Troy, Engineering.
ROBB, RICHARD M., Port Washington, Psychology.
ROSEN, ALAN J., New York, Chemistry.
RUBENFELD, FRANK A., New York, Psychology.
RUGG, ROBERT, College Point, Engineering.
RUSH, BRENDA S., Brooklyn, Psychology.
SACKS, GERALD E., Ithaca, Mathematics.
SALTZMAN, STEPHEN N., Brooklyn, Zoology.
SAXE, BERNARD D., Flushing, Chemistry.
SCHENK, GEORGE F., Tonawanda, Engineering.
SCHIFF, LEONARD, Brooklyn, Engineering.
SCHILDRETH, CARL L., Woodmere, Long Island, Chemistry.
SCHULMAN, JEROME M., New Rochelle, Chemistry.
SCHULZ, JONAS, New York, Physics.
NEW YORK - Continued

Schwartz, Alan W., Brooklyn, Biochemistry.
Schwitzer, Paul A., Pelham, Mathematics.
Sゴール, John S., Valley Stream, Chemistry.
Sheppard, Gino C., Peekskill, Physics.
Shapiro, David B., Buffalo, Physics.
Schofield, David L., Brooklyn, Physics.
Shepp, Lawrence A., Brooklyn, Mathematics.
Simon, David S., Rego Park, Chemistry.
Silver, Bette, New York, Social Sciences.
Silverstone, Harris J., Harrison, Chemistry.
Snellgrove, Richard A., Mt. Vernon, Chemistry.
Socolow, Alan W., Brooklyn, Biochemistry.
Sipgall, John S., Valley Stream, Chemistry.
Spivak, David H., St. George.
Stallard, Nancy V., Baldwin, Chemistry.
Stallman, John F., Great Neck, Biology.
Stallman, Alexander A., Buffalo, Biology.
Stallman, Susan V., Yonkers, Biology.
Stallman, Michael D., Jamaica, Mathematics.
Stallman, Ruth P., New York, Biochemistry.
Sutherland, Ivan E., Scarsdale, Engineering.
Tannenbaum, Michael J., Bronx, Physics.
Tabacon, Philip A., Berlin, Engineering.
Towell, David G., Fillmore, Earth Sciences.
Wahlg, Michael A., Woodsid, Physics.
Watson, George E. III, New York, Biology.
Webb, Julian P., Rochester, Physics.
Weinman, Robert W., Brooklyn, Physics.
Weiss, Gerald, Far Rockaway, Anthropology.
Wigg, Robert T., Poughkeepsie, Mathematics.
Wolman, Herbert D., Flushing, Engineering.
Wozna, Michael, New York, Physics.
Zimmerman, Seth I., New York, Mathematics.
Zwengowski, Peter D., Bronx, Mathematics.

Cooperative Graduate

Acton, Nancy V., Baldwin, Chemistry.
Akey, Alic J., Great Neck, Biology.
Alexander, Alexander A., Buffalo, Biology.
Allison, Susan Y., Yonkers, Biology.
Ambrogio, Raymond R., Brooklyn, Engineering.
Al, James B., New York, Mathematics.
Bikell, Ralph F., Hartsdale, Physics.
Bach, Michael S., Brooklyn, Mathematics.
Barbour, David, Patchogue, Engineering.
Bendarek, Alexander R., Buffalo, Mathematics.
Bhrens, Earl W., Rensselaer, Eath Sciences.
Bell, Howard E., Medusa, Mathematics.
Bellcourt, Sr Kathleen, Troy, Mathematics.
Berger, Charles A., Brooklyn, Mathematics.
Berglas, Hilda, Spring Valley, Medical Science.
Barnold, Stanley, Flushing, Earth Sciences.
Bleistehin, Norman, Jamaica, Mathematics.
Bloch, Gene E., Buffalo, Mathematics.
Bolker, Ethan D., Brooklyn, Mathematics.

Booker, John F., Ithaca, Engineering.
Brand, Lincoln E., Orchard Park, Mathematics.
Brandstein, Alfred G., Brooklyn, Mathematics.
Briggs, James B., Glen Cove, Engineering.
Bronowitz, Laurence E., Fredonia, Engineering.
Broido, Sheldon M., Bronx, Psychology.
Corner, Michael A., New York, Biology.
Crump, William J., Brooklyn, Chemistry.
Currie, Douglas G., Rochester, Physics.
De Nettille, Richard L., Nyack, Engineering.
Delissio, Noel, Brooklyn, Engineering.
Dennett, Bruce, Riverdale, Psychology.
Diament, Paul, Brooklyn, Engineering.
DiCarlo, James A., Buffalo, Physics.
Dietz, Russell N., Wantagh, Engineering.
Duhi, David, Staten Island, Engineering.
Eidson, John C., Scarsdale, Engineering.
Faden, Arnold M., Bronx, Social Sciences.
Falk, Theodore J., Dryden, Engineering.
 узнан, James T., Yonkers, Psychology.
Freinleih, Julius, Brooklyn, Physics.
Feldman, Paul D., Floral Park, Physics.
Finn, Paul, Brooklyn, Physics.
Finley, Kay T., Poughkeepsie, Chemistry.
Finney, Anthony E., Brooklyn, Chemistry.
Flacks, Richard, Brooklyn, Psychology.
Fleming, Henry, Jackson Heights, Chemistry.
Foster, Edward J., Syracuse, Physics.
Fox, Joel S., Brooklyn, Engineering.
Frahn, Wayne, Briarcliff Manor, Microbiology.
Frank, Ernest C., Astoria, Agriculture.
Franklin, Allan D., Brooklyn, Physics.
Frascatoro, Robert C., Amsterdam, Mathematics.
Friedland, Isaac, New York, Chemistry.
Friedman, David H., Long Beach, Engineering.
Friedman, Joseph N., Brooklyn, Physics.
Fuchs, Edward, Jamaica, Engineering.
Gardner, Laurence T., Jr., New York, Mathematics.
Garbell, Martin H., Brooklyn, Physics.
Garrod, Claude, New York, Physics.
Gibbs, Gunther E., Richmond Hill, Engineering.
Gelman, Harry, New York, Physics.
Glickfield, Barnett W., New York, Mathematics.
Goldstein, Robert P., Binghamton, Engineering.
Good, Robert P., New York, Zoology.
Green, Michael E., Brooklyn, Biochemistry.
Greenblatt, Robert, Brooklyn, Mathematics.
Greene, Samuel L., Syracuse, Physics.
Hammer, Roberta E., Brooklyn, Chemistry.
Harington, Joseph J., Brooklyn, Engineering.
Herman, Harvey E., Brooklyn, Chemistry.
Herzberg, Norman P., Brooklyn, Mathematics.
Hill, David B., Brooklyn, Engineering.
Howe, David J., Buffalo, Biology.
JOHNSON, STANLEY L., Ithaca, Biochemistry.
JORDAN, THOMAS F., Rochester, Physics.
Kantar, ALFRED H., Ithaca, Chemistry.
Katz, MEYER, Bronx, Physics.
KenneN, DONALD M., Endicott, Chemistry.
Klawansky, SIDNEY, Brooklyn, Physics.
Knight, LONNIE W., New York, Chemistry.
Koehler, ROBERT M., Bronx, Psychology.
Kramer, BARRY F., New York, Mathematics.
Krumbein, SIMON J., Brooklyn, Chemistry.
Kuby, GEORGE E., Bronx, Mathematics.
Lahsen, RICHARD J., Germantown, Engineering.
Lauber, KENNETH S., Queens, Zoology.
Levine, IRENE S., New York, Psychology.
Levine, JAMES L., Neponsit, Physics.
Levy, HAROLD, New York, Engineering.
Levy, PAUL F., Bronx, Biochemistry.
Lipf, ALAN L., New York, Engineering.
Lindzen, RICHARD S., New York, Mathematics.
Linton, FRED E., New York, Mathematics.
Locher, ROBERT, Scarsdale, Engineering.
LontzoLGi, VINCENT J., Elmhurst, Long Island, Chemistry.
Lubin, JONATHAN D., Staten Island, Mathematics.
Lutomierski, RICHARD F., Brooklyn, Engineering.
Lutz, CHARLES A., West Hempstead, Chemistry.
Mahoney, JAMES R., Syracuse, Earth Sciences.
Mazo, JAMES E., Syracuse, Physics.
McINNERY, THOMAS J., New York, Mathematics.
McqueENAH, JOHN P., Bronx, Biochemistry.
Meyer, RICHARD M., Snyder, Mathematics.
Migliore, JOSEPH J., New York, Zoology.
Milstein, SANDRA, New York, Psychology.
Minsky, JEROME R., Brooklyn, Mathematics.
Mooser, ROBERT E., Larchmont, Mathematics.
Moss, ROBERT A., Brooklyn, Chemistry.
Muldoon, JAMES F., Brooklyn, Engineering.
Nager, JOEL A., Jamaica, Mathematics.
Newman, STEVEN S., Baldwin, Physics.
Niederer, JOHN E., Pearl River, Social Sciences.
Nor, RALPH W., New York, Chemistry.
Novick, AARON J., Brooklyn, Physics.
Olshaker, ARNOLD E., Brooklyn, Engineering.
O'Malley, THOMAS F., New York, Physics.
Parker, ALFRED B., Jamestown, Earth Sciences.
ParmeRNER, CHARLES S., Rochester, Chemistry.
Penchina, CLAUDE M., New York, Physics.
Perel, JAMES M., Bronx, Chemistry.
Perry, FREDERICK W., Holley, Engineering.
Petersen, SUSANNE C., Jamestown, Chemistry.
Pincus, EDWARD R., New York, Social Sciences.
Pittaro, MACIO J., Jr., Long Island, Engineering.
Rader, CHARLES M., Brooklyn, Engineering.
Raffel, HELEN, New York, Social Sciences.
Rand, GEORGE, Bronx, Psychology.
Reifenberg, GERALD H., Brooklyn, Chemistry.
Reilly, ST. MARGARET, Hoosick Falls, Zoology.
Repetski, JAMES E., Buffalo, Engineering.
Riener, AARON, Brooklyn, Chemistry.
Rickett, RICHARD M., Brooklyn, Engineering.
Rose, ROBERT M., Flushing, Engineering.
Rosen, ERWIN S., New York, Psychology.
Rost, ERNEST S., New Palts, Palts.
Rotenberg, RONALD I., Bronx, Engineering.
Rothlieber, STEPHEN D., Bronx, Engineering.
Rothschild, WALTER G., New York, Chemistry.
Salkind, JEANNETTE, Bronx, Mathematics.
Salomon, RAMON A., New York, Chemistry.
Samaritano, JOHN, Elmhurst, Engineering.
Scharff, RAYMOND, Brooklyn, Zoology.
Schulze, ARTHUR W., Forest Hills, Chemistry.
Siebers, ROBERT J., Brooklyn, Mathematics.
Silvert, WILLIAM L., New York, Physics.
Slade, EDWIN, Riverdale, Engineering.
Snow, WOLSEY, Brooklyn, Mathematics.
Smith, JOHN M., Oswego, Mathematics.
Sobel, ALAN, Brooklyn, Physics.
Sovoy, ROBERT M., Brooklyn, Mathematics.
Stell, GEORGE R., New York, Mathematics.
Sweeney, DONALD R., Floral Park, Psychology.
Teiger, MARTIN L., Brooklyn, Physics.
Tierney, Myles, New York, Mathematics.
Tilson, SETMOU, New York, Earth Science.
Tona, PATRICK J., Brooklyn, Mathematics.
Vanderknot, GERARD G., Rochester, Chemistry.
Walton, DANIEL C., Syracuse, Botany.
Warten, RALPH M., Levittown, Mathematics.
Weinold, HARRIS D., Bronx, Engineering.
Weiss, ERNEST, New York, Psychology.
Weiss, JONAS, New York, Chemistry.
Whyte, WAMBURG, MARY E., Nyack, Zoology.
Wright, ROBERT E., New York, Psychology.

Postdoctoral
BARLAND, PETER, Forest Hills, Medical Sciences.
Bokzi, JOHN A., Binghamton, Microbiology.
Bray, RICHARD C., New York, Biochemistry.
Cebra, JOHN J., New York, Biochemistry.
Chobover, STEPHEN L., New York, Psychology.
Dolliver, JAMES S., Ithaca, Rotary.
Eckert, ROGER O., New York, Zoology.
Goldberg, ABRAHAM, Staten Island, Physics.
Greenblum, MARTIN, Brooklyn, Mathematics.
Kadanoff, LEO P., New York, Physics.
Long, LEON E., Fallsades, Earth Sciences.
Nass, MARGIT M., Long Beach, Zoology.
Noyin, DONALD, Brooklyn, Psychology.
Pasto, DANIEL J., Erin, Chemistry.
Rickard, CHARLES S., Ithaca, Agriculture.
Staubus, HERMANN L., Kew Gardens, Chemistry.
Tsang, WING, Forest Hills, Chemistry.
Tully, EDWARD J., Jr., Mastic Beach, Mathematics.
Wincow, GERSON, Brooklyn, Chemistry.
Wendt, RICHARD H., West Henrietta, Medical Sciences.

Senior Postdoctoral
BARKSDALE, W. LANE, New York City, Microbiology.
De Wite, JOHN W., Ithaca, Physics.
NEW YORK—Continued

GREGORY, JOHN D., New York City, Biochemistry.

HOLK, GEORGE G., Jr., Syracuse, Zoology.

KOLCHIN, ELLIS R., New York, Mathematics.


MANNWALD, JERROLD, Ithaca, Chemistry.

OSTER, GERALD, New York, Chemistry.

ROSS, ARCHABALD F., Ithaca, Botany.

SALFETTER, EDWIN R., Ithaca, Astronomy.

SEB, ADRIAN M., Ithaca, Genetics.

SUNYAT, ANDREW W., Long Island, Physics.

Science Faculty

ALLARD, MARY J., Buffalo, Chemistry.

AUSTIN, WILLIAM J., Jr., Potsdam, Engineering.

BRASTED, PAUL W., Syracuse, Engineering.

CALLEON, STEPHEN W., Jr., Houghton, Chemistry.

DORATO, PETER E., Brooklyn, Engineering.

EBENSTADT, RAYMOND, Schenectady, Engineering.

JACOBSON, EUGENE D., New York, Physics.

KOCHEISBERGER, ROBERT C., Jamestown, Zoology.

LANNI, ROBERT A., New York, Physics.

LARSON, ROBERT D., Potsdam, Mathematics.

MIKOCHIK, STEPHEN T., Brooklyn, Engineering.

NANCERONI, LOUIS L., Ithaca, Agriculture.

FOMILLA, FRANK E., Brooklyn, Physics.

POURING, ANDREW A., Farmingdale, Engineering.

PARNOWITZ, WALTER, Brooklyn, Mathematics.

PEELLY, NATHAN T., Jr., Mamaroneck, Mathematics.

SIGLIA, LAURENCE E., New York, Mathematics.

SOCHENEN, HENRY F., Brooklyn, Engineering.

STOTZ, KERWIN C., Troy, Engineering.

Summer Fellowships for Graduate Teaching Assistants

BALLARD, KAIT, New York, Social Sciences.

BARILE, RAYMOND C., New York, Chemistry.

BARRETT, JEANNE S., Troy, Chemistry.

BASILE, DOMINICK V., Yonkers, Botany.

BIRNSTREIFELD, HERMAN J., Woodhaven, Mathematics.

BLOOM, LEA K., New York, Zoology.

BOOKER, JOHN F., Ithaca, Engineering.

BOWKER, CHARLES G., Ithaca, Chemistry.

BURTON, DONALD J., Ithaca, Chemistry.

CARE, ROBERT W., Rochester, Chemistry.

CASSIDY, MARTIN M., Pleasantville, Earth Sciences.

CHELTON, BRUCE L., Tonawanda, Mathematics.

DITTRICK, JOHN W., Great Neck, Chemistry.

ERIG, IRMA B., Brooklyn, Mathematics.

FINK, RICHARD D., New Rochelle, Chemistry.

GARDNER, ALBERT H., Syracuse, Psychology.

GARDNER, LAURENCE T., Jr., New York, Mathematics.

GOICHERN, GABRIEL D., Rochester, Psychology.

GRONEMAN, ANTHONY L. F., Rochester, Psychology.

GRAF, ROBERT A., New York, Engineering.

GRIEB, JAMES D., Jr., Ithaca, Botany.

HAPE, BRUCE W., Ithaca, Engineering.

HESSLER, HOWARD R., Webster, Zoology.

HUMBERBERG, HOWARD T., Buffalo, Mathematics.

ISAACSON, ROBERT B., New York, Chemistry.

KATZ, MARCIA J., New York, Physics.

KAUFMAN, SHELDON E., Bronx, Physics.

KINLOCH, JOHN, New York, Mathematics.

KONE, MARVIN J., Naples, Chemistry.

KOWAL, LESLIE R., Ithaca, Engineering.

KRAMER, BARRY F., New York, Mathematics.

LAFAUS, DONALD W., Valley Stream, Chemistry.

MARSHALL, PATRICIA A., Whiteston, Chemistry.

Mazo, JAMES E., Syracuse, Physics.

MCNAMARA, BRENDA C., Brooklyn, Mathematics.

MCNAMARA, LAWRENCE R., Ithaca, Zoology.

MEGANAH, WALTER F., Merrick, Agriculture.

MEIER, EDWARD G., Ithaca, Chemistry.

MORSE, J. EDWIN, Brooklyn, Agriculture.

NIXON, JAMES, Ithaca, Chemistry.

OTREMB, EDWARD D., Lackawanna, Chemistry.

PETERTON, BRUCE R., Syracuse, Mathematics.

PENCE, FELIX J., Ithaca, Engineering.

PUTZ, HERBERT E., Brooklyn, Mathematics.

RHODES, RICHARD W., Port Washington, Botany.

RIEPPEL, MARC A., Mathemathics.

Graduate Teaching Assistants

BOWICKI, EUGENE P., Cheektowaga, Mathematics.

RUSKAY, RICHARD J., New York, Engineering.

SANDYK, ERIC T., Rochester, Chemistry.

SCHEN, HARVEY, Syracuse, Physics.

SCHRIB, BRIAN B., Brooklyn, Physics.

SCHWARTZ, LEONARD H., New York, Chemistry.

STEiner, JOAN E., Yonkers, Chemistry.

TEICHMAN, PAUL, Brooklyn, Physics.

TILTON, STANLEY, New York, Earth Sciences.

TOMLINSON, PERCY A. S., Brooklyn, Psychology.

Summer Fellowships for Secondary School Teachers

BADER, AARON, Brooklyn, Physics.


BLUM, HAMILTON S., Farmingdale, Mathematics.

BOROWSKY, NATHAN, New York, Physics.

BOZIN, LUCILE E., Marcellus, Psychology.

CISW, FRANKLYN P., Harpursville, Chemistry.

DODER, IRVING ALLEN, New York, Mathematics.

DRILLING, ELMO V., Buffalo, Mathematics.

FEIT, JULIUS, North Bellmore, Physics.

FRANKEL, BERRA R., New York, General Sciences.

GAPPNET, SC, KATHERINE B., Bardonia, Chemistry.

GERLOCK, FRANK GEORGE, Nyack, Biology.

GERSLAK, FRANK W., Chateaugay, General Sciences.

GIANTURCO, ANGELO J., Buffalo, General Sciences.

GLICKMAN, ABRAHAM M., New York, Mathematics.

GRELLE, EINAR F., Huntington Station, Biology.

GROSSMAN, ISRAEL, New Rochelle, Mathematics.

HALIN, ANNE E., Hyde Park, General Sciences.

JAFFE, BENJAMIN, New York, Mathematics.

KELLNER, Sr., MARIA, Rochester, Chemistry.
KLING, MELVIN PHILIP, New York, Mathematics.
LANCESTER, GEORGE, Franklin Square, Mathematics.
LESTER, WILLINGTON F., Hancock, Biology.
LOHR, SR., M. RAYMOND, Brooklyn, Mathematics.
MAJDALY, ROBERT S., Queens, Mathematics.
MAIDEN, ST. JOANNE T., New York, Mathematics.
McINTYRE, PATRICK J., New Hyde Park, Chemistry.
MICHEL, ROBERT H., New York, Mathematics.
MILLER, ROBERT R., Sr., Plattsburgh, Zoology.
MILTNER, BR. M. CONRAD, New York, Chemistry.
PARVER, HARRY, Brooklyn, Chemistry.
POELKER, Sr. M. LEONARD, New York, Mathematics.
POELK, Sr. M. LEONARD, New York, Mathematics.
RITZ, WILLIAM C., Snyder, Biology.
RUDERHAN, RUTH M., New York, Mathematics.
SACKS, NORBERT, Martin, Brooklyn, Biology.
SICHEL, RONALD F., Weldon, Biology.
SMITH, JOHN E., Nyack, Chemistry.
SONEN, RALPH PAUL, Northport, Biology.
STADMAN, EARL D., Glen Head, Chemistry.
TAFF, MARJORIE LANG, Woodmere, Mathematics.
VAUGHAN, DANIEL, New Rochelle, Biology.
WALTER, ROGER W., Clyde, General Sciences.
WEISS, EMANUEL, New York, Physiology.
WEISS, RICHARD, New York, Zoology.
WEISSMAN, SIMON A., Brooklyn, Chemistry.
ZIMMERMANN, ROBERT F., Dewitt, Biology.

NORTH CAROLINA

Graduate
BLAKE, ROY B., Jr., Winston-Salem, Engineering.
BYRANT, DAVID R., Greensboro, Chemistry.
CARLTON, TERRY S., Reidsville, Chemistry.
CONRY, MURPHY B., Rockwell, Chemistry.
DAVIS, HOWARD T., Hendersonville, Chemistry.
GIBBS, HYATT M., North Wilkesboro, Physics.
GRiffiths, PHILLIP A., Raleigh, Mathematics.
HAPPER, WILLIAM, Lenoir, Physics.
HUBBARD ROBERT L., Chapel Hill, Physics.
LOHR, LAWRENCE L., Jr., Kings Mountain, Chemistry.
NANNEY, CECEL A., Black Mountain, Physics.
NORSWORTHY, DAVID R., Chapel Hill, Social Sciences.

Cooperative Graduate
CARROLL, FRANK L., Chapel Hill, Chemistry.
COWARDIN, ROBERT L., Raleigh, Engineering.
DARAS, JAMES M., Jr., Mayesville, Psychology.
FALLAW, WALLACE C., Hillsboro, Earth Sciences.
HALL, ELIZABETH A., Salisbury, Chemistry.
HILLS, FRANCIS A., Battleboro, Earth Sciences.
KIMEL, JACOB D., Jr., Winston-Salem, Physics.
OWN, GORDON, N., Jr., Raleigh, Engineering.
SCHUTZ, WILFRED M., Raleigh, Genetics.
STONECYPHER, ROY W., Raleigh, Genetics.
WORM, STEWART D., Durham, Chemistry.

Postdoctoral
KING, HARRY F., Greensboro, Chemistry.
KORNEGAY, WADE M., Mount Olive, Chemistry.
WEISS, NORMAN K., Winston-Salem, Zoology.

Senior Postdoctoral
KORN, DANIEL A., Chapel Hill, Engineering.
PALMATUS, EVERETT D., Chapel Hill, Physics.

Science Faculty
BEATTY, OZELL K., Salisbury, Botany.
ELLER, JOHN G., Cullowhee, Zoology.
HARRISBERGER, JESSE R., Raleigh, Engineering.
HARRISBERGER, LEE EDGAR, Raleigh, Engineering.
MANN, WILLIAM R., Chapel Hill, Mathematics.
SHUFORD, FLORENCE V., Hickory, Mathematics.

VICK, ALPHONSO R., Winston-Salem, Botany.

Summer Fellowships for Graduate Teaching Assistants
ADAMS, DAVID A., Raleigh, Botany.
ASHBOOK, BETTY J., Cullowhee, Mathematics.

SCIENCE FACULTY
CHEEK, WILLIAM E., Matthews, Chemistry.
DRAKE, RUBEN C., Concord, Mathematics.
HALGAAR, ALBERT H., Mooresville, Mathematics.
LAIVINDAR, ELIZABETH E., Henderson, Mathematics.
SCHULTE, NANCY W., Winston-Salem, Biology.
TESTER, JOE CALAWAY, Gastonia, Biology.
YOUNG, WILLIAM H., Charlotte, Biology.

NORTH DAKOTA

Graduate
SCHRAM, THOMAS F., Mayville, Chemistry.
UTQAABD, JOHN I., Minot, Earth Sciences.

Cooperative Graduate
LUNSETTER, WAYNE B., Fargo, Biochemistry.
MCDONALD, JAMES T., Fargo, Psychology.
MUNRO, JANE A., Fargo, Zoology.
ONSHAGHER, JEROME A., West Fargo, Zoology.

Postdoctoral
THOMAS, PAUL E., Fargo, Mathematics.

Science Faculty
OLSON Lloyd D., State College, Mathematics.
TREGER, VERNON L., Grand Forks, Medical Sciences.

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NORTH DAKOTA—Continued

Summer Fellowships for Graduate Teaching Assistants

BABE, WILLIAM A., Beach, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BAUM, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.

OHIO

Graduate

ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
COOPER, Paul D., Worthington, Earth Sciences.

ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.

OHIO

Graduate

ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
COOPER, Paul D., Worthington, Earth Sciences.

ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
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ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
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BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
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ADAM, WALTER, Cincinnati, Chemistry.
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Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
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BPhot, THOMAS J., Fargo, Zoology.
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Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
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ARONS, CAROL J., Columbus, Physics.
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BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
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ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellows for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.

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ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
COOPER, Paul D., Worthington, Earth Sciences.

ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.

OHIO

Graduate

ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
COOPER, Paul D., Worthington, Earth Sciences.

ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.

OHIO

Graduate

ARONS, CAROL J., Columbus, Physics.
BARGER, JAMES E., Toledo, Engineering.
BrauN, Henry M., Tiffin, Physics.
BRUUN, DONALD C., Toledo, Chemistry.
BRADBURY, BENNET B., Findlay, Physics.
CARROLL, Tom W., Cincinnati, Engineering.
CHANNEY, ROBIN W., Columbus, Mathematics.
COOPER, Paul D., Worthington, Earth Sciences.

ADAM, WALTER, Cincinnati, Chemistry.
ALMOWT, JUDY A., Dayton, Zoology.
ANDERSON, CHARLES T., Columbus, Mathematics.

Summer Fellowships for Graduate Teaching Assistants

BABB, JAMES W., Fargo, Engineering.
BABB, JAMES W., Jr., Fargo, Chemistry.
BPhot, THOMAS J., Fargo, Zoology.
Nelson, Delbert R., Ellendale, Medical Sciences.

Summer Fellowships for Secondary School Teachers

JACOBSON, Robert L., Grand Forks, Mathematics.
OLENBERGER, Alvin W., Wimbledon, Mathematics.
ROBINSON, DAVID P., Cincinnati, Chemistry.
SCHORN, THOMAS A., Dayton, Mathematics.
SCHROEBER, DIETRICH, Enon, Physics.
SCOTT, DIANE M., Troy, Zoology.
SKATSKY, JAMES M., Worthington, Engineering.
SOKPOVICH, NICHOLAS J., Canfield, Physics.
THOMAS, DAVID T., Barneville, Engineering.
WAHL, PHILIP L., Cleveland Heights, Chemistry.
WALTERS, VIRGINIA F., Cleveland, Physics.
WAMPFLER, DALI L., Lima, Chemistry.
WEISBERGER, DAVID W., Delphos, Chemistry.
WHITLOCK, RICHARD T., Cleveland, Physics.
WILCOX, JOHN H., Columbus, Engineering.
WILLIAMS, RObERT L., Coshocton, Chemistry.
ZERLA, FREDERICK J., Dillonvale, Mathematics.

Postdoctoral
CARRUTHERS, PETER A., Middletown, Physics.
CHATO, JOHN C., Dayton, Engineering.
ROBERT, DONALD A., Parma, Botany.
ROBERT, JOEL L., Cleveland, Biochemistry.
Koenig, DONALD F., Cuyahoga Falls, Biophysics.
SAUER, KENNETH H., East Cleveland, Chemistry.
WEBLEY, DOROTHY E., Wapakoneta, Medical Sciences.
ZWOLIINIK, JAMES J., Cleveland, Chemistry.

Senior Postdoctoral
GOLDBEOR, JOSHUA N., Trotwood, Physics.
Utter, MERTON F., Cleveland, Biochemistry.
ZEIS, HAROLD H., Dayton, Chemistry.

Science Faculty
BRUMBAUGH, JOE H., Greenville, Biology.
CONLON, HOWARD E., Cleveland, Engineering.
DILLON, THADDREW III, Youngstown, Mathematics.
GOLDBERG, SAMUEL, Oberlin, Mathematics.
LOEBE, RAYMOND C., Cleveland, Engineering.
LEUDEN, JOHN F., New Concord, Psychology.
LUTZ, ARTHUR L., Springfield, Physics.
MAJOR, JOHN K., Cleveland, Physics.
MILLER, WILLIAM R., Cleveland, Engineering.
ROGERS, KAY T., Oberlin, Medical Science.
SHIVELY, RALPH L., Cleveland, Mathematics.
STEVENS, richard H., Cincinnati, Mathematics.
TRANBUEF, WILLIAM E., Gambier, Mathematics.
VANCE, ELBRIDGE P., Oberlin, Mathematics.
WEBSTER, ELIZABETH E., Cleveland, Chemistry.
YEWELL, BERNARD J., Youngstown, Mathematics.

Summer Fellowships for Graduate Teaching Assistants
BACHOF, WILLIAM E., Columbus, Zoology.
BRANDT, JOHN F., Celina, Chemistry.
CASTLE, RICHARD T., Urbana, Physics.
Cherry, ROBERT H., Jr., Columbus, Engineering.
COOPMAN, WILLIAM E., Columbus, Mathematics.
CUBELI, SAM R., Greenfield, Chemistry.
<table>
<thead>
<tr>
<th>Name</th>
<th>College</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams, Roy B.</td>
<td>Oklahoma</td>
<td>Physics</td>
</tr>
<tr>
<td>Barnes, Robert F., Jr.</td>
<td>Oklahoma</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Blade, Richard A.</td>
<td>Oklahoma</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Butler, Larry G.</td>
<td>Oklahoma</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Corey, Jane E.</td>
<td>Tulsa</td>
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<td>Zavodny, Eugene N., Red Rock</td>
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**Cooperative Graduate**

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**Science Faculty**

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**Summer Fellowships for Graduate Teaching Assistants**

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**Summer Fellowships for Secondary School Teachers**

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<td>Duffer, William R., Stratford</td>
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<td>Epstein, Donald M., Claremore</td>
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<td>Guthrie, Bennett M., Sr., Tahlequah</td>
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<td>Trout, Verdine E., Sand Springs</td>
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**Oregon**

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<td>Duster, Francis L., North Bend</td>
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**Cooperative Graduate**

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**Senior Postdoctoral**

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**Science Faculty**

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Summer Fellowships for Graduate Teaching Assistants

BAILEY, DUANE W., Creswell, Mathematics.
GOEBEL, JACK B., Corvallis, Mathematics.
HERMAN, WILLIAM S., Portland, Zoology.
MALKMULL, WILLIAM, Eugene, Physics.
NEUMANN, HERSCHEL, Eugene, Physics.
WILEON, JIM D., Wecoma Beach, Agriculture.
WITTENBERG, DON A., Corvallis, Mathematics.

Summer Fellowships for Secondary School Teachers

BIEDRMAN, ARTHUR A., Tigard, General Sciences.
OTERTON, EARL H., Lakeview, Mathematics.
ROGERS, JAMES V., Portland, Mathematics.
STAPLETON, CHRISTOPHER, Portland, General Sciences.

PENNSYLVANIA

Graduate

ADLER, RONALD J., Pittsburgh, Physics.
ANDERSON, WILLIAM C., North Warren, Physics.
ANDERSON, JAMES B., State College, Engineering.
BARR, MICHAEL, Drexel Hill, Mathematics.
BEALS, RICHARD W., Erie, Mathematics.
BERNAM, STUART, Philadelphia, Physics.
BOOK, DAVID L., Norristown, Physics.
CLARK, WILLIAM R., Newtown Square, Physics.
DAVIES, JOHN I., Pittsburgh, Chemistry.
DRESDEN, ALAN R., Philadelphia, Mathematics.
FENSELAU, ALLAN H., Norristown, Biochemistry.
FISHER, ALDERSON L., Philadelphia, Physics.
FUEGEL, HENRY F., Haytowry, Astronomy.
FRASER, MALCOLM D., Pittsburgh, Engineering.
GRISINGER, LADON D., Zionsville, Mathematics.
GRAY, DONALD M., Milton, Biophysics.
GREEN, JOHN L., Philadelphia, Biophysics.
GRISINGER, LADON D., Zionsville, Mathematics.
GRAY, DONALD M., Milton, Biophysics.
GREEN, JOHN P., Jr., Philadelphia, Engineering.
HARTENBAUM, BRUCE, Philadelphia, Engineering.
HARTSHORNE, ROBERT C., Pittsburgh, Mathematics.
HUGHTON, DAVID D., Media, Earth Sciences.
HUDCOK, GEORGE A., Norristown, Genetics.
HUGGENIN, GEORGE R., Buck Hill Falls, Astronomy.
HUNT, RICHARD L., Doylestown, Chemistry.
JÖNGE, LEWIS E., Jr., Pittsburgh, Engineering.
JOSEPH, PETER M., Chester, Physics.
KAUFMANN, JOEL M., Huntingdon Valley, Chemistry.
KAUFMANN, HARRY, Clifton Heights, Psychology.
KRAAL, ALLAN M., State College, Mathematics.
LAIBSON, GARY B., Philadelphia, Mathematics.
LARKIN, FRANCIS P., Middletown, Mathematics.
LEITH, JOHN D., Jr., Bethlehem, Zoology.
LEWIS, RONALD M., State College, Earth Sciences.
LUDEMANN, OLIVER G., Philadelphia, Chemistry.
MANDERLEAU, ELLI M., Philadelphia, Mathematics.
McNUTT, DOUGLAS P., Philadelphia, Physics.
MITCHELL, BARRY J., Pittsburgh, Engineering.
MITRIOVICH, WALTER, Erie, Earth Sciences.
MORAN, PAUL R., Couderaysport, Physics.
MOTE, ROBERT D., Allentown, Mathematics.
NOBLE, ROBERT W., Jr., Ardmore, Biochemistry.
OSTERHOLTZ, FREDERICK D., Drexel Hill, Chemistry.
PHILLIPS, THOMAS O., Lansdowne, Physics.
RICCI, ALAN W., Bridgeville, Engineering.
ROSENBERG, RONALD C., Philadelphia, Engineering.
RYSE, WALTER R., Old Forge, Chemistry.
SCHICK, WILLIAM C., Jr., Pittsburgh, Physics.
SCHNABEL, GEORGE A., Ambler Post Office, Engineering.
SEIDERS, VICTOR M., York, Earth Sciences.
SEKESKA, ROBERT F., Pittsburgh, Physics.
SHAFAKER, ROBERT H., Media, Engineering.
SHAFER, ROBERT A., Philadelphia, Physics.
SHANAHAN, PATRICIA A., Bethel Park, Psychology.
SHOBT, JAMES J., Philadelphia, Social Sciences.
SMITH, ALLAN L., Jenkintown, Chemistry.
SQUIRES, ROBERT G., Ambridge, Engineering.
STERNBERG, RAB E., Pittsburgh, Physics.
STONEBERRY, JOHN O., Berlin, Physics.
SUNA, ANDRIS, Broomall, Physics.
TELLER, DAVID C., Wilkes-Barre, Biology.
THORINGTON, RICHARD W., Wyndmoor, Biology.
TRAHANOVSKY, WALTER S., Conemaugh, Chemistry.
TRICMAN, THOMAS L., Media, Physics.
WIBIS, CHARLES, Jr., Philadelphia, Biochemistry.
WHINATON, ANDREW B., Pittsburgh, Social Sciences.
WILLIAMS, DEBORAH C., Moylan, Zoology.
WILMOT, WILLIAM H. II, Pittsburgh, Chemistry.
WOLL, EDWIN J., Jr., Pittsburgh, Physics.
WOOD, DON J., Corry, Engineering.
WRIGHT, ARTHUR W., Broomall, Social Sciences.
YOUNG, PATRICIA A., Sugarloaf, Psychology.
YOUNG, FREDERICK D., Marriana, Engineering.
ZARTMAN, ROBERT E., Lititz, Earth Sciences.
PENNSYLVANIA—Continued

Cooperative Graduate

AARON, RONALD, Philadelphia, Physics.

ANGSTADT, CAROL N., Ardmore, Biochemistry.

BARRETT, JOSEPH J., Scranton, Physics.

BATCHELLOR, ROBERT W., Glenside, Chemistry.

BEAN, RALPH J., Pittsburgh, Mathematics.

BENGEL, JOSEPH J., Scranton, Physics.

BROGAN, MARIANNE C., Jim Thorpe, Chemistry.

BURRUS, PAY B., York, Mathematics.

CAMPBELL, MARY K., Havertown, Chemistry.

CABBY, FRANCIS A., Philadelphia, Chemistry.

CABMAN, ROBERT A., Pittsburgh, Psychology.

CRAWLEY, ROBERT J., Duquesne, Physics.


DAVIS, RALPH J., Pittsburgh, Chemistry.

DUFF, JAMES, Jr., State College, Mathematics.

ECKSTEIN, JAMES A., State College, Earth Sciences.

EBERT, ALBERT B., University Park, Agriculture.

ELBIOY, PHILIP L., Philadelphia, Psychology.

FRANK, MICHAEL, University Park, Microbiology.

FULTON, PAUL F., Pittsburgh, Engineering.

GALLagher, WILLIAM P., Pittsburgh, Chemistry.

GOLDMAN, AARON S., Red Lion, Mathematics.

GREEN, MELVIN H., Pittsburgh, Biochemistry.

GREENLEAF, FREDERICK P., Allentown, Mathematics.

GRIMM, GEORGE, Shamokin, Biochemistry.

HARRIS, JOHN F., Clarion, Zoology.

HAY, JAMES, Jr., State College, Agriculture.

HEINZEL, JAMES, Jr., Pittsburgh, Psychology.

HILL, DAVID G., Terre Haute, Indiana.

HONG, CHONG H., Pittsburgh, Pharmacy.

HORNBY, CLIFFORD C., Jr., Sharpsville, Engineering.

HOTLAND, JAMES B., Pittsburgh, Chemistry.

IBANZ, MANUEL L., University Park, Microbiology.

JACOB, THEODORE, Jr., Pittsburgh, Psychology.

JONES, RICHARD H., University Park, Mathematics.

KAPROWSKI, EDWARD, Pittsburgh, Engineering.

KAPLAN, RICHARD E., Upper Darby, Engineering.

KESLER, JAMES, Jr., Pittsburgh, Chemistry.

KLAMANN, HARRY W., St. Thomas, Psychology.

LAND, RICHARD A., State College, Earth Sciences.

LEBOY, PHILIP S., Bryn Mawr, Biochemistry.

LONG, MORGAN A., Sugarloaf, Mathematics.

MALIN, ANTHONY P., Ashley, Chemistry.

MARK, ROBERT H., Pittsburgh, Engineering.

MARTENS, EDWARD J., Pittsburgh, Engineering.

MASSON, RAYMOND A., Jr., University Park, Earth Sciences.

MICHEL, GEORGE M., State College, Earth Sciences.

MILLER, MELVIN H., Philadelphia, Engineering.

MORRIS, CLIFTON, Fredericktown, Botany.

MUDD, SAMUEL A., Gettysburg, Psychology.

NIKER, PERN P., Pomfrett, Engineering.

NYSTROM, WILLIAM A., Emporium, Engineering.

PACHMAN, JERROLD M., State College, Earth Sciences.

PERRIN, CHARLES L., Pittsburgh, Chemistry.

PEARCE, FRANK E., Homer City, Physics.

PLOWDE, MARCIA J., Reading, Chemistry.

RAINEY, JOHN F., State College, Chemistry.


RICHMAN, FRANK, Philadelphia, Mathematics.

RISBROUGH, GEORGE A., Weatherly, Engineering.

ROVNYAK, JAMES, Jr., Ford City, Mathematics.

RUSSELL, RUTH, Pine Grove Mill, Agriculture.

SCHELL, ALBERT B., Philadelphia, Engineering.

SEYLER, RICHARD G., Dubois, Physics.

SHAW, W. W. CULLEN, Bethlehem, Earth Sciences.

SHMATKO, JAMES, Jr., Williamsport, Mathematics.

SLATER, JOHN G., State College, Earth Sciences.

SWEET, EDWARD E., Jr., Pittsburgh, Genetics.

TAKE, MARK D., Wyncote, Engineering.

TAYLOR, BARRY N., Philadelphia, Physics.

TEMBR, PETER, Philadelphia, Social Sciences.

TITUS, JAMES J., State College, Engineering.

TORENBORG, ROBERT J., Pittsburgh, Physics.

WARE, ROBERT G., Johnstown, Engineering.

WILLIAMS, JOHN E., University Park, Astronomy.

WARDEN, ROBERT B., Swarthmore, Engineering.

WILSON, SAMUEL H., Hershey, Microbiology.

YATES, CARL C., University Park, Mathematics.

ZIMMER, ARTHUR, State College, Earth Sciences.

ZUCKER, CARL A., Philadelphia, Chemistry.

Postdoctoral

BLACK, SAMUEL H., Hershey, Microbiology.

FAITH, CARL C., University Park, Mathematics.

GRIM, SAMUEL O., Dallastown, Chemistry.

HARE, CURTIS H., Clifton Heights, Chemistry.

JONES, RICHARD H., Ridley Park, Mathematics.

MCFADDEN, JAMES T., State College, Zoology.

VON, FRANKENBERG CARL A., Philadelphia, Chemistry.

Senior Postdoctoral

TUTTLE, O. FRANK, University Park, Earth Sciences.

Science Faculty

BORTNER, ALFRED L., University Park, Agriculture.

DEMOFF, HOWARD E., Selinsgrove, Botany.

FABIA, MICHAEL W., Beaver Falls, Zoology.

FULTON, PAUL F., Pittsburgh, Engineering.

HEIMEN, RALPH T., University Park, Mathematics.

JACOB, ALAN M., University Park, Physics.

LEMONICK, AARON, Hatfield, Physics.
Summer Fellowships for Graduate Teaching Assistants

BACHMAN, JERALD G., Philadelphia, Psychology.
BRIMHALL, JAMES E., Pittsburgh, Physics.
DHAGGAN, MARIANNE C., Jim Thorpe, Chemistry.
CHARLESWORTH, LLOYD J., Allentown, Earth Sciences.
COLEBRO, CAROL J., Pittsburgh, Mathematics.
DEPPE, ROBERT H., Jr., Swarthmore, Microbiology.
DEBARNISIAN, MICHAEL, State College, Chemistry.
DEITZ, ROBERT E., Pittsburgh, Engineering.
DIEMENDERGER, ALFRED J., North Braddock, Chemistry.
DIMKO, FRANK N., Philadelphia, Engineering.
DUNCAN, ROBERT L., Bellefonte, Mathematics.
FORREMAN, WILLIAM C., Lansdowne, Chemistry.
GORDON, ALBERT M., New Brighton, Physics.
GRIFFIN, RODGER W., Jr., Verona, Chemistry.
GRIM, SAMUEL O., Dallastown, Chemistry.
GUZER, ALBERT L., Bridgeville, Earth Sciences.
HAGER, ROBERT B., Huntingdon Valley, Chemistry.
HARRISON, PAUL C., Jr., Montrose, Psychology.
HOROWITZ, DANIEL H., State College, Earth Sciences.
JENNINGS, STEPHEN O., Allston Park, Engineering.
KELLER, GEORGE E., II, State College, Engineering.
KORN, LAURA L., Havertown, Chemistry.
MALINAKAS, ANTHONY F., Ashley, Chemistry.
MATHEN, JOHN M., Lincoln University, Engineering.
MAH, JON R., Bainbridge, Medical Sciences.
MEIER, JOSEPH F., Sharon, Chemistry.
MILLER, HARVEY I., Philadelphia, Medical Sciences.
MORRIS, JOHN R., II, Harritsbugh, Chemistry.
MORT, THOMAS E., Bellefonte, Mathematics.
NICHOLS, ROBERT D., Reading, Chemistry.
OPLINGER, CARL S., Walnutport, Zoology.
REESE, LARRY H., Pittsburgh, Physics.

Summer Fellowships for Secondary School Teachers

AMERMAN, EDWARD G., Philipsburg, General Sciences.
AMSELMO, SHIRLEY M., New Castle, Biology.
ARThUR, ROBERT S., Pittsburgh, Mathematics.
ATTY, ALEX G., Windber, General Sciences.
BEAM, ST. M. ALICE, Pittsburgh, Biology.
BENNETT, EARL ARTHUR, Shillington, Biology.
BONNER, ST. M. CATHERINE, Philadelphia, General Sciences.
DEMITZAS, BRO. GREGORY C., Philadelphia, Chemistry.
DOTTRELL, STEPHEN S., Elizabethtown, Mathematics.
DOUGHERTY, MARK, Sr., Erie, Mathematics.
EYHAN, EDWARD WILLIAM, West Lawn, Mathematics.
HERMAN, RICHARD P., Hatboro, Mathematics.
HOUGH, RAYMOND EARLE, Monongaeha, Mathematics.
JONES, DOROTHY LOIS, St. College, Mathematics.
KEIBER, RICHARD L., Jim Thorpe, Mathematics.
KNOCk, ST. M. MARTIN DS. P., Altoona, Biology.
KUHN, RALPH EDWARD, Emmitsburg, Mathematics.
LATHAM, WILLIAM S., Philadelphia, Biology.
MALESKEY, PAUL E., Allentown, Chemistry.
MAMARY, ALBERT, Shillington, Mathematics.
MARKLEY, FRED ALLEN, Shippenburg, General Sciences.
MCLAUGHLIN, JANE ANN, Harrisburg, Mathematics.
MOYER, STUART F., York, Mathematics.
PATTERSON, BRO. D. STEPHEN, Pittsburgh, Mathematics.
PETRACCA, ST. M. JEAN, Greensburg, Mathematics.
SACKARIS, ST. M. P., Coraopolis, Zoology.
SCHILLINGER, ST. M. J., Pittsburgh, Biology.
SCHRODER, KENNETH E., Geo. School, Zoology.
SHARKAN, WILLIAM W., Allentown, Chemistry.
SNELL, JANIS ROSE, York, Mathematics.
SPIELANS, DANIEL PAUL, Pittsburgh, Mathematics.
TATE, CLAYS, Erie, Mathematics.
WEISS, ST. M. OLIVETTE, Lancaster, General Sciences.
ZICCARDI, VINCENT, New Hope, Biology.
ZIMMERMAN, PATRICIA V., Elkins Park, Mathematics.

Bennett, Robert E., Lansdowne, Engineering.
SJOBERG, BERNARD M., Jr., McKeesport, Psychology.
SWEET, EDWARD E., Jr., Pittsburgh, Genetics.
TORRENCE, ROBERT J., Pittsburgh, Physics.
VON FRANKENBURG, CARL A., Philadelphia, Chemistry.
WELSH, ROBERT E., Pittsburgh, Physics.
WIEZ, KAREN E., Bryn Mawr, Earth Sciences.
WITOWSKI, JOHN J., Olyphant, Microbiology.
WUNDERLICH, FRANCIS J., Narberth, Chemistry.
RHODE ISLAND

Graduate
ALMGREN, FREDERICK J., Jr., Providence, Mathematics.
BEAUVET, ROBERT A., Woonsocket, Chemistry.
DUCKETT, STEVEN W., Providence, Physics.
FINK, ARTHUR D., Providence, Mathematics.
NAVAR, JUDITH L., Riverside, Botany.
FINK, ARTHUR C., Warwick, Earth Sciences.

Cooperative Graduate
BROCHU, RONALD L., Narragansett, Engineering.
CETTELLA, JOHN P., Providence, Engineering.
MOOREHOUSE, ARNOLD S., Westerly, Agriculture.
SALZMAN, RICHARD M., Providence, Engineering.
SCHARB, MARCEL F., Providence, Engineering.

Senior Postdoctoral
BUCHER, DAVID A., Providence, Mathematics.

Science Faculty
KLINE, JACOB, Kingston, Engineering.
NACCI, VITO A., Kingston, Engineering.

Summer Fellowships for Graduate Teaching Assistants
ALMGREN, FREDERICK J., Jr., Providence, Mathematics.
CAPOTOSTO, AUGUSTINE, Jr., Cranston, Chemistry.
DIPPOPO, ASCARIO G., Providence, Chemistry.
SHERMAN, EDWARD O., Jr., North Providence, Chemistry.

Summer Fellowships for Secondary School Teachers
SCHUMANN, MO. VIRGINIA M., Providence, Mathematics.
WATTS, SR. M. TERENCE, Riverside, Mathematics.

SOUTH CAROLINA

Graduate
ARRINGTON, CHARLES A., Jr., Clemson, Chemistry.
COLEMAN, EDMUND B., Jr., Abbeville, Psychology.
CONNOR, LAURENCE N., Jr., Barnwell, Engineering.
PERKINS, HAROLYN KING, Marion, Chemistry.
PYRON, RAYMOND S., Taylors, Chemistry.

Cooperative Graduate
BARTON, KENNETH R., Spartanburg, Chemistry.
BOWERS, KERRY W., Columbia, Chemistry.
FOLEY, JOHN M., Anderson, Psychology.
GETTYS, WILLIAM E., Union, Physics.
HASKELL, PETER L., West Columbia, Engineering.
JONES, EDWIN R., Jr., Dillon, Physics.
KELLETT, JAMES C., Jr., Spartanburg, Chemistry.
OVERBECK, JAMES W., Aiken, Physics.
OVERTON, JAMES R., Columbia, Chemistry.
RUGHMIRE, JOHN H., Charleston, Physics.
STANLEY, WILLIAM D., Columbia, Engineering.

STRICKLAND, ERASMUS H., Columbia, Biophysics.
WENGBOW, HENRY R., Columbia, Engineering.
WHITE, HAROLD M., Clemson, Chemistry.

Science Faculty
KING, DONALD A., Clemson, Mathematics.
NOLAND, J. HUBERT, Jr., Columbia, Engineering.
SNELL, ABRAHAM W., Columbia, Engineering.

Summer Fellowships for Graduate Teaching Assistants
BARTON, KENNETH R., Spartanburg, Chemistry.
CATHY, WADE T., Jr., Campobello, Engineering.
DEBEE, THAD W., Jr., Columbia, Engineering.
FARMER, LARRY B., Travelers Rest, Chemistry.
PAREL, JAMES F., Timmonsville, Zoology.
TILLER, WILLIAM E., Anderson, Physics.

Summer Fellowships for Secondary School Teachers
JENSEN, PATRICK E., Anderson, Mathematics.
KIRK, MARGARET G., Columbia, Mathematics.

SOUTH DAKOTA

Graduate
BUSWELL, LINDA M., Aberdeen, Psychology.
HURWITZ, CHARLES E., Sioux Falls, Engineering.
KRETZINGER, ROBERT H., Pickstown, Medical Sciences.
MINEHART, RALPH C., Mitchell, Physics.
RASMUSSEN, GARY H., Clark, Chemistry.
RAYMOND, LEE H., Watertown, Engineering.

Cooperative Graduate
BENSON, ROBERT H., Vermillion, Mathematics.
FISCHBACH, THOMAS J., Rapid City, Social Sciences.
FULLER, ALBERT W., Madison, Mathematics.
JOHNSON, PATRICK E., Raymond, Mathematics.
NELSON, ALLAN D., Dallas, Mathematics.
Pierce, Robert L., Huron, Mathematics.
RAPPEL, DELVIN G., Brookings, Engineering.

Science Faculty
ALLUM, MARVIN O., Vermillion, Zoology.
DORNSIDGE, JAMES N., Vermillion, Engineering.
SHAW, ROSS F., Wessington Springs, Zoology.

Summer Fellowships for Graduate Teaching Assistants
DUGLE, DAVID L., Vermillion, Chemistry.
FANSLOW, DONALD J., Yankton, Zoology.
MATTSON, ARTHUR J., Hot Springs, Social Sciences.
MYERS, GERALD A., Brookings, Botany.
ROBINSON, THOMAS A., Hot Springs, Chemistry.

Summer Fellowships for Secondary School Teachers
CONKLIN, AUGUST, Aberdeen, Biology.
CONWAY, JOHN V., Yankton, Mathematics.
HILLS, CAROL L., Mitchell, Biochemistry.
TENNESSEE

Graduate
BACHELOR, Thomas H., Nashville, Earth Sciences.

BLOOMER, James L., Knoxville, Chemistry.

Campbell, Alfredus N., Martin, Biochemistry.

CARMICHAEL, Halden H., Oak Ridge, Chemistry.

Dietrich, Frank S., Memphis, Physics.

GOTTO, Antonio M., Jr., Nashville, Biochemistry.

Hinton, Don R., Savannah, Mathematics.

KLOW, Janet S., Memphis, Biochemistry.

MCCALL, John T., Jr., Nashville, Mathematics.

MCCALLUM, Charles E., Memphis, Mathematics.

Rittenberg, Alan, Nashville, Physics.

Thompson, James R., Memphis, Mathematics.

Cooperative Graduate
Beauchamp, Nicholas A., Nashville, Physics.

Burt, Philip B., Memphis, Physics.

Doran, Ed S., Memphis, Physics.

Hinton, Robert N., Nashville, Physics.

Heimberg, Laura K., Nashville, Psychology.

Jensen, Donald R., Goodlettsville, Agriculture.

Johnson, Joseph A. III, Nashville, Physics.

Kerk, Robert H., Nashville, Mathematics.

Koen, Frank M., Nashville, Psychology.

McClure, Joseph A., Jr., Nashville, Physics.


Rader, Charles P., Knoxville, Chemistry.

Smith, Alphonso L., Memphis, Mathematics.

Terry, Claude E., Jr., Cleveland, Genetics.

Todo, Aaron W., Murphysboro, Chemistry.

Waller, John W., Johnson City, Engineering.

Woody, Charles O., Jr., Somerville, Agriculture.

Postdoctoral
Cook, Clarence E., Jefferson City, Chemistry.

Senior Postdoctoral
Lindsey, Dan L., Oak Ridge, Genetics.

Schwartz, Drew, Oak Ridge, Genetics.

Smith, Lawton H., Oak Ridge, Zoology.

Thomas, David G., Oak Ridge, Engineering.

Science Faculty
Bond, Lora, Knoxville, Biology.

George, Ted M., Murray, Physics.

Johnson, Carroll D., Memphis, Engineering.

Krypty, Bro., Robert H., Memphis, Physics.

Rawls, John M., Clarksville, Medical Sciences.

Thigpen, Charles C., Knoxville, Mathematics.

Wilson, Robert L., Chattanooga, Earth Sciences.

Summer Fellowships for Graduate Teaching Assistants
Dowsing, Roland G., Nashville, Chemistry.

Ginter, Dorothy E. S., Nashville, Chemistry.

Harris, Roy H., Nashville, Medical Sciences.

Norris, Daniel H., Knoxville, Botany.

Purcell, William P., Memphis, Chemistry.

Sutherland, Ian I. W., Jefferson City, Zoology.

Summer Fellowships for Secondary School Teachers
Fortune, Jimmie C., Bartlett, Mathematics.

Switzer, Maureen W., Maryville, Biology.

Torrence, Martha W., Antioch, Mathematics.

Texas

Graduate
Anderson, John E., Austin, Engineering.


Barrett, Virgil E. II, Austin, Physics.

Bechtel, Robert G., Jr., Groves, Engineering.

Bergman, Martin R., Dallas, Engineering.

Beyers, Robert J., Austin, Zoology.

Bott, Jerry F., Tyler, Engineering.

Clark, Barry G., Canyon, Astronomy.

Collins, Robert J., Fort Worth, Microbiology.

Collins, Francis A., Austin, Physics.

Dahn, David M., Dallas, Mathematics.

Dolgoff, Abraham, Houston, Earth Sciences.

Doror, James R., Kingsville, Mathematics.


Drewry, George E., Austin, Zoology.

Grabner, Sandy, Pharr, Mathematics.

Gross, Mereith G., Jr., Amarillo, Earth Sciences.

Hale, Leon A., Lubbock, Engineering.

Hanes, Harold B., Jr., Fort Worth, Mathematics.

Hyder, Monte L., Rockdale, Chemistry.

James, Robert L., El Paso, Engineering.

Johnson, Claiborne H., Jr., Dallas, Mathematics.

Jones, Benjamin F., Houston, Mathematics.

Manuel, Thomas A., Austin, Chemistry.

Moore, Edvin D., Dallas, Physics.

Moore, Robert E., Austin, Zoology.

Myers, Ralph L. II., Wichita Falls, Earth Sciences.

Nisbet, Alex R., San Angelo, Chemistry.

Randol, Burton S., San Antonio, Mathematics.

Simmons, Marvin G., Carrollton, Earth Sciences.

Stover, Harry L., Dallas, Physics.

Stubblefield, Travis E., Denton, Medical Sciences.

Van Ackern, Thomas V., Alpine, Chemistry.

Willey, Frederick G., Garland, Chemistry.

Wilson, Robert W., Houston, Astronomy.

Wisdom, Norvell E., Jr., Crane, Chemistry.

Cooperative Graduate
Able, Paula R., Dublin, Biochemistry.

Amer, William A., Longview, Chemistry.

Bagby, Roland M., Texas City, Medical Sciences.

Barlow, Carl A., Jr., San Antonio, Physics.

Rohme, Hollis C., Mabank, Physics.

Brown, Judith C., Bryan, Chemistry.

Cheshnut, Dwaine A., Houston, Chemistry.

Collins, Carl B., Jr., San Antonio, Physics.

Cooper, John N., San Antonio, Chemistry.

Cramer, John G., Jr., Houston, Physics.

Cunningham, Aaron M., Bryan, Engineering.

Cyphers, Joel E., Houston, Engineering.
TEXAS—Continued

DABSY, RONALD, Dallas, Engineering.
DAVENPORT, MONTY, E., Lubbock, Engineering.
ELLISON, TOMMY R., Dallas, Chemistry.
FINCH, RAY W., Bay City, Engineering.
FORT, JAMES G., San Antonio, Physics.
FRITZ, ROSE M., Houston, Chemistry.
GOLDENBERY, TOMMY G., Jacksonville, Mathematics.
HAASE, DONALD J., Nixon, Engineering.
HARVEY, JEREY B., Austin, Psychology.
HASTY, ROBERT A., Dallas, Chemistry.
JORDAN, RICHARD H., Mexia, Agriculture.
KIMBALL, AUDREY P., Houston, Biochemistry.
LADNER, SIDNEY J., Houston, Chemistry.
LYNN, ROBERT L., San Antonio, Engineering.
MCGUINN, MICHAEL L., College Station, Chemistry.
MOTT, DAVID L., El Paso, Physics.
OTTMARS, DELBERT M., San Marcos, Engineering.
PERRY, PATRICIA L., Corpus Christi, Psychology.
QUADE, CHARLES R., Dallas, Physics.
REYNA, EDDIE, Bryan, Physics.
REYNOLDS, TOM D., Austin, Engineering.
RICHARDSON, RICHARD H., Mexia, Agriculture.
RUCHELMAN, MARYWON, Bells, Chemistry.
RUNNELS, LYNN K., Houston, Chemistry.
SALEMAN, PAUL K., Austin, Engineering.
SMITH, THOMAS A., Dallas, Physics.
TUCKER, RICHARD L., Hereford, Engineering.
WILLIAMS, MARTHA S., Austin, Psychology.
ZUMWALT, ROBERT E., Halletsville, Engineering.

Postdoctoral

OSBORNE, WETMAR Z., Pampa, Physics.
VANDegrEE, THEODORE, Corpus Christi, Engineering.

Senior Postdoctoral

ADAMS, JOHN A. S., Houston, Earth Sciences.
RIGGS, AUDREY F. II, Austin, Biochemistry.

Science Faculty

ALBRITTON, OSCAR W., College Station, Engineering.
BASKIN, HERBERT H., Jr., Dallas, Engineering.
EDDS, EWIN A., Beaumont, Chemistry.
EPERS, BILL G., Austin, Engineering.
HARMON, GERALD S., College Station, Physics.
MARMION, KEITH R., Lubbock, Engineering.
MARSH, FRANK D., Jr., San Antonio, Engineering.
MORELAND, ROBERT A., Jr., Lubbock, Mathematics.
POELLARD, JAMES J., Austin, Engineering.
SYBERT, JIM R., Denton, Physics.
WESTBURY, JOHN E., Houston, Mathematics.
WOOD, JOHN W., Lubbock, Earth Sciences.

Summer Fellowships for Graduate Teaching Assistants

ATCHISON, THOMAS A., Richland Springs, Mathematics.
AVERRITT, ROBERT T., Austin, Social Sciences.
CRAM, IRA H., Jr., Houston, Earth Sciences.
DALTON, CHARLES, Pasadena, Engineering.

FrAVENK, JULIUS L., Houston, Engineering.
HOPKINS, OTHO N., Jr., Waco, Earth Sciences.
HUBBARD, WILLIAM M., Houston, Physics.
MCCRAY, WILLIAM B., Forreston, Genetics.
NEUBERT, LYLE E., Lubbock, Chemistry.
PERRYMAN, JOHN E., Austin, Mathematics.
POZEL, ANTHONY L., Jr., Victoria, Engineering.
RAMSEY, JERRY D., College Station, Engineering.
STEPHENSON, ROBERT W., Austin, Engineering.
WHITE, JOHN T., Austin, Mathematics.
WILHELM, PAUL A., Austin, Engineering.
YORK, M. G. Jr., Waco, Social Sciences.

Summer Fellowships for Secondary School Teachers

ALLEN, ST. M. BOSCO, Wichita Falls, Mathematics.
BALL, FRED, JR., San Antonio, Mathematics.
Bennett, Norman J., Sherman, Mathematics.
BRETON, ST. M. CATHERINE, Corpus Christi, Mathematics.
CONTRADA, JOSE, Falfurrias, Mathematics.
DAVIS, GERALDINE, Fort Worth, Mathematics.
GIBBS, SARAH M., Houston, Mathematics.
HAVEN, ST. VINCENT, Bells, Mathematics.
HERNANDEZ, MATILDA L., Corpus Christi, Mathematics.
HUMMER, WILLIAM E., Austin, Mathematics.
KIANI, EARL RAPHAEL, El Paso, Mathematics.
MATTHEWS, WILMOTH C., El Paso, Chemistry.
MINNER, ST. JEANNE, Corpus Christi, Biology.
ORAB, NOLAN LARRY, Alice, Mathematics.
SANSOM, IRA R., Kerrville, Mathematics.
SCHULTE, HERBERT W., Waller, General Sciences.
WALKER, SHERRELL G., Gladewater, Mathematics.

UTAH

Graduate

BERGERSON, HAVEN E., Salt Lake City, Physics.
BREWER, JOHN M., Salt Lake City, Biochemistry.
EVELETH, GLEN E., St. George, Physics.
FOOTE, ARN, Moab, Chemistry.
GILES, EUGENE, Salt Lake City, Anthropology.
IVY, EVAN L., Ogden, Engineering.
LAWRENCE, GEORGE M., Salt Lake City, Physics.
MORTIMER, ROBERT G., Logan, Chemistry.
RUNNELS, DONALD D., Salt Lake City, Earth Sciences.
TOLMAN, CHADWICK, A., Salt Lake City, Chemistry.

Cooperative Graduate

ALLEN, ROBERT L., Ogden, Engineering.
ANDERSEN, TERRIL N., Salt Lake City, Chemistry.

Postdoctoral

BIRGE, HAVEN E., Salt Lake City, Chemistry.
BRIDGER, JOHN M., Salt Lake City, Mathematics.
EVERTS, GLEN E., St. George, Physics.
FOOTE, ARN, Moab, Chemistry.
GILES, EUGENE, Salt Lake City, Anthropology.
IVY, EVAN L., Ogden, Engineering.
LAWRENCE, GEORGE M., Salt Lake City, Physics.
MORTIMER, ROBERT G., Logan, Chemistry.
RUNNELS, DONALD D., Salt Lake City, Earth Sciences.
TOLMAN, CHADWICK, A., Salt Lake City, Chemistry.
Boyack, James R., Salt Lake City, Chemistry.
Bryner, John C., Salt Lake City, Physics.
Hemml, John F., Salt Lake City, Mathematics.
Johnson, Owen W., Salt Lake City, Physics.
Peterson, Ellis R., Ephraim, Chemistry.
Wagner, Richard L., Jr., Salt Lake City, Physics.
Woodbury, Elwood T., Monroe, Engineering.

Postdoctoral
Senior Postdoctoral
Bryner, John C., Salt Lake City, Physics.
Hampson, Ellis R., Ephraim, Chemistry.

Summer Fellowships for Graduate Teaching Assistant
Albrecht, Rulon S., Emyer, Genetics.
Bert, Myron G., Salt Lake City, Earth Sciences.
Bryner, John C., Salt Lake City, Physics.
Lambert, Virginia M., Roosevelt, Social Sciences.
Moyle, Richard W., American Fork, Earth Sciences.
Musser, Rosmond J., Salt Lake City, Zoology.
Smith, Kay H., Provo, Psychology.
Terblanche, Wilford J., Salt Lake City, Chemistry.
Wagner, Richard L., Jr., Salt Lake City, Physics.

Summer Fellowships for Secondary School Teachers
King, A. Latell, Orem, Zoology.

VERMONT
Graduate
Guilmette, Lee M., Richford, Mathematics.
Cooperative Graduate
Carpenter, James E., Springfield, Engineering.
Gibbs, Gerald V., Windsor, Earth Sciences.
Sargent, George D., Barre, Chemistry.

Postdoctoral
Abraham, Ralph H., Burlington, Mathematics.
Science Faculty
Webb, Martin L., Northfield, Engineering.

VIRGINIA
Graduate
Adams, John B., Charlottesville, Physics.
Adler, Eric G., Arlington, Physics.
Baker, Robert G., Charlottesville, Mathematics.
Culley, Frank M., Jr., Arlington, Physics.
Doughty, William C., Willis Wharf, Physics.
Everage, Thomas B., Big Stone Gap, Engineering.
Garrick, Michael D., Hampton, Biochemistry.
Gray, Frances E., Richmond, Chemistry.
Haley, Joseph A., Ashland, Mathematics.
Hartman, Richard L., Norfolk, Physics.

Loudes, Carl R., Arlington, Engineering.
Montgomery, Charles G., Hollins College, Physics.
Murray, Joseph J., Jr., Lexington, Genetics.
O'Brien, Walter F., Jr., Roanoke, Engineering.
Renniger, George H., Fredericksburg, Physics.
Stephens, Stephen V., Falls Church, Physics.

Cooperative Graduate
Baird, Hugh R., Christiansburg, Medical Sciences.
Baker, Thomas N., III, Petersburg, Chemistry.
Barnard, Marlene B., Richmond, Chemistry.
Beckers, Phillip M., Falls Church, Engineering.
Davis, Hawthorne A., Quinton, Physics.
Gibert, Anne J., Falls Church, Zoology.
Gibson, Robert H., Charlottesville, Psychology.
Hudson, Cecil L., Jr., Charlottesville, Physics.
Hummon, Margaret R., Oakton, Botany.
Hunt, Lois T., Hopewell, Zoology.
Jeffrey, Jackson E., Richmond, Medical Sciences.
McClanahan, Charlene, Grundy, Genetics.
McDarmid, Robert C., Vienna, Engineering.
Nordquist, Paul E. R., Jr., Arlington, Chemistry.
Pleasant, Beverly A., Richmond, Genetics.
Thaxton, George D., Richmond, Physics.
Tolbert, Charles R., Richmond, Astronomy.
Walker, William S., Charlottesville, Physics.

Postdoctoral
Licht, Robert J., Roanoke, Biochemistry.
Science Faculty
Baum, Parker B., Williamsburg, Chemistry.
Hall, Anita B., Hampton, Zoology.
Hopkins, Manell H., Jr., Blacksburg, Engineering.
Monaiah, Irene P., Blacksburg, Mathematics.
Palmer, Viola G., Hampton, Medical Sciences.
Priestley, W. C., Jr., Charlottesville, Biology.
Stewart, Robert A., Hollins College, Chemistry.

Summer Fellowships for Graduate Teaching Assistants
Albert, Eugene, Charlottesville, Mathematics.
Barr, James W., Abingdon, Zoology.
Bowers, Lawrence E., Lynchburg, Chemistry.
Nordquist, Paul E. R., Jr., Arlington, Chemistry.
Russell, Stephen M., Abingdon, Zoology.
Tolbert, Charles R., Richmond, Astronomy.
Waddill, Marcellus E., Meherrin, Mathematics.

Summer Fellowships for Secondary School Teachers
Haack, Louise B., Annandale, Mathematics.
Virginia—Continued

Milliken, Harold Roy, New Market, Biology.
Rion, James W., Marshall, Mathematics.
Stine, Mary E., Alexandria, Mathematics.
Tisinger, Claude G., Dayton, General Sciences.

Washington

Graduate

Birkeland, Peter W., New Market, Biology.
Brooks, Floyd L., Jr., Seattle, Chemistry.
Brown, Ronald E., Everett, Physics.
Crawford, Keith J., Port Orchard, Mathematics.

Washington, University

Alvord, Bicaxd P., Centralia, Earth Sciences.
Atkinson, Reilly, Wadena, Physics.

Washington, University—Continued

Atkinson, John A., Pullmnn, Physics.
Barlow, Frederick O., Seattle, Anthropology.
Barker, Paul W., Soohomish, Astronomy.
Barnes, James P., Seattle, Mathematics.
SUMMER FELLOWSHIPS FOR GRADUATE ASSISTANTS

CHAMBERS, WILLIAM L., Morgantown, Engineering.

GONANO, JOHN R., Hedgesville, Physics.

MILLER, FRANK D., Morgantown, Psychology.

SUMMER FELLOWSHIPS FOR SECONDARY SCHOOL TEACHERS

ADAMS, DOROTHY, Weirton, Biology.

BARKLEY, ROBERT E., Morgantown, Engineering.

BAUMANN, JOHN J., Madison, Chemistry.

BILINSKI, CHARLES F., Madison, Mathematics.

BONEBON, WILLIAM L., Morgantown, Engineering.

BOWER, PAUL W., Madison, Chemistry.

BRENNER, GEORGE E., South Milwaukee, Biochemistry.

CANNON, LAWRENCE O., Madison, Mathematics.

CRAWFORD, RODERICK C., South Milwaukee, Biology.

DE MATHILDE, MARK W., Milwaukee, Mathematics.

DE ROCHA, JAMES M., Madison, Mathematics.

DILLMAN, DAVID R., Madison, Mathematics.

DUNCAN, ROBERT A., Two Rivers, Chemistry.

EMERY, RANDALL C., Milwaukee, Chemistry.

FARRELL, EDWARD E., Madison, Engineering.

FISHER, RALPH M., Milwaukee, Engineering.

FLETCHER, JOHN O., Jr., Milwaukee, Mathematics.

FOX, CHARLES F., Madison, Mathematics.

FRANKLIN, LEONARD L., Pelham, Botany.

FRANKLIN, POPEL S., Madison, Physics.

FRANKLIN, RUSSELL R., Madison, Engineering.

FRANKLIN, THOMAS, Jr., Madison, Earth Sciences.

FRANKLIN, WALTER L., Cleveland, Botany.

GARRISON, JAMES W., Madison, Mathematics.

GIBSON, THOMAS, Madison, Earth Sciences.

GILLESPIE, THOMAS, Madison, Zoology.

GORMAN, JULIUS, Jr., Madison, Engineering.

GRIFFIN, DOROTHY, South Milwaukee, Biochemistry.

GRIFFIN, ROBERT A., South Milwaukee, Botany.

HANSON, ROBERT, Madison, Chemistry.

HICKS, GEORGE H., Madison, Chemistry.

HODGSON, CHARLES A., Madison, Mathematics.

HODGSON, JOHN L., Madison, Psychology.

HODGSON, WILLIAM H., Madison, Psychology.

HODGSON, WALTER A., Madison, Psychology.

HODGSON, WILLIAM H., Madison, Psychology.

HODGSON, WALTER A., Madison, Psychology.

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HODGSON, WALTER A., Madison, Psychology.
### Institutes Chosen by Fellowship Awardees

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**Present or Most Recent Institutional Affiliation of Individuals Offered Science Faculty, Senior Postdoctoral, and Postdoctoral Fellowships**

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APPENDIX F
Publications of the National Science Foundation

This listing includes publications issued by the National Science Foundation during fiscal year 1960. A complete listing of available Foundation publications may be obtained upon request to the Foundation.

The publications marked with a price may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Other publications are available from the Foundation.

ANNUAL REPORTS

Ninth Annual Report, for fiscal year ending June 30, 1959: NSF 60-1, $1.
First Annual Weather Modification Report 1959 (A yearly report on activities in the field of weather modification): NSF 60-24, $0.35.

MANPOWER AND EDUCATION REPORTS
1. Scientific Manpower—1959 (The latest in a general series which contains the papers of the Conference on Scientific Manpower held in conjunction with the meetings of the AAAS in December of each year): NSF 60-34, $0.30.
2. Scientific Manpower Bulletins
3. Information on Science Scholarships and Student Loans: NSF 60-33.
4. Statistical Handbook on Science Education: NSF 60–38, $0.55.
5. Fellowship, Institute, and Other Education Program Announcements (with instructions for applying).

RESEARCH AND DEVELOPMENT ECONOMIC REPORTS
2. Reviews of Data on Research and Development (A series of leaflets devoted to specific aspects of research and development economics):
   No. 20. Funds for Research and Development Performance in American Industry: NSF 60-38, $0.10.
   No. 19. Funds for Research and Development in Colleges and Universities, Fiscal 1959: NSF 60-21, $0.10.
   No. 18. Research and Development Expenditures of Selected Groups of Nonprofit Institutions: NSF 60-7, $0.05.
No. 17. Funds for Research in Medical Schools, 1957–58: NSF 60-10, $0.10.

4. Methodology of Statistics on Research and Development: NSF 59-38, $0.65.

SCIENTIFIC INFORMATION EXCHANGE REPORTS
1. Scientific Information Notes (Bimonthly periodical reporting national and international developments in scientific and technical information dissemination): Single copy $0.25, subscription $1.25 per year.
   Vol. 1, No. 4, August–September 1959: NSF 4-R.

2. Scientific Information Activities of Federal Agencies (A series of pamphlets describing the policies and procedures of Federal Agencies relative to their scientific activities):
   No. 4. U.S. Government Printing Office: NSF 60-9, $0.05.
   No. 3. Department of Commerce: NSF 59-58, $0.15.

SCIENCE ADMINISTRATION REPORTS
2. Program Activities of the National Science Foundation: NSF 59-32.