NSF *one year later . . .*

Despite the limited budget under which the National Science Foundation must operate, its first year has proved to be productive. *By* ***Dwight E. Gray***

A YEAR AND A MONTH AGO one of these Washington Reports was devoted to an interview with Dr. Alan T. Waterman, Director of the then newly-established National Science Foundation. In that interview Dr. Waterman outlined the general long-range program of the Foundation as he and the National Science Board visualized it at that time and described in some detail the several specific areas of activity which he planned to emphasize in the initial phase of the work. It is appropriate at this time—the approximate close of the first complete fiscal year of NSF's operation—to summarize the very substantial accomplishments to date of this organization which can mean so much to the future of science in this country and, therefore, to the future of the nation itself.

The progress made by NSF during this first year is sufficiently impressive not to require bolstering or rationalizing by alibi-like qualifying statements. The picture would be less than complete or accurate, however, if one did not recognize certain limiting factors which have played a major role in determining the framework within which the operation has had to be carried on. Chief among these is the fact that whereas the enabling legislation for NSF authorized up to $15,000,000 for operation during the fiscal year 1952, the sum actually appropriated was only $3,500,000. Moreover, even this modest appropriation was in doubt until November 1951, complicating immeasurably the initial organization problems common to all new agencies. Despite these handicaps, the Foundation in the last seven months has made real progress. It has built up a staff, has developed aggressive, workable operating procedures, has awarded the first class of graduate fellowships, has made grants for research, and has supported a variety of activities in the scientific personnel, education, and information fields.

Positions in the principal staff of the Foundation now have largely been filled with the roster of the Office of the Director reading as follows:

Director	Alan T. Waterman
Deputy Director	C. E. Sunderlin, formerly scientific director, Office of Naval Research, London
Assistant Director for Biological Sciences	John Field, on leave as head of the Department of Physiology, University of California, Los Angeles
Medical Research	John Field (Acting)
Mathematical, Physical and Engineering Sciences	Paul E. Klopsteg, on leave as director of research, Northwestern Technological Institute
Scientific Personnel and Education	Harry C. Kelly, formerly scientific adviser to Supreme Commander, Allied Powers, Japan
Administration	Wilson F. Harwood, formerly executive assistant to director, National Bureau of Standards
General Counsel	William A. W. Krebs, Jr., formerly counsel, Reactor Development Division, Atomic Energy Commission
Chief, Scientific Information Office	Robert Tumbleson, formerly with AEC Division of Information Services
Comptroller	Charles G. Gant, formerly systems accountant, Office of Navy Comptroller
Executive Secretary, National Science Board	Lloyd M. Trefethen, formerly technical aid to deputy and chief scientist, Office of Naval Research

Chairman of the National Science Board is Chester I. Barnard, president of the Rockefeller Foundation. Dr. Barnard succeeded the first chairman, President James B. Conant of Harvard University, in December.

The National Science Foundation's graduate fellowship awards for the academic year 1952–53 were described in some detail in the May issue of *Physics Today* and so need only be briefly summarized here. A total of 569 predoctoral and 55 postdoctoral fellowships in the natural sciences was awarded with the successful fellows being selected from approximately 3,000 scientists who applied. Applications were received from all parts of the United States and its possessions and from U. S. citizens abroad. As required by the National Science Foundation Act of 1950, all fellows were selected on the basis of ability, with wide geographic distribution being the second criterion applied in cases where abilities appeared substantially equal. The ratio of fellows to applicants is not indicative of the relative abilities of those applying, since available funds introduced an economic limiting factor. About 40 percent of the over-all 1952 NSF budget was earmarked for the fellowship program.

Over a fourth of the awards were made to first-year graduate students in contrast to other federal fellowship programs in which major emphasis has been placed upon advanced students. In the Atomic Energy Commission and National Institute of Health fellowships for 1951, for example, less than one-tenth were awarded to first-year predoctoral applicants. The Foundation believes that the development of new scientific talent is of the utmost importance at the present time, and hopes its policy will encourage new college graduates who have scientific aptitude and interest to proceed to advanced study.

Subject fields in which fellowships were awarded included agriculture, anthropology, biological sciences, chemistry, engineering, earth sciences, mathematics, and physics. The fellows received previous degrees from some 190 U. S. institutions in more than 40 states, Alaska, and Hawaii, and from five foreign universities. Harvard headed the list with 51 graduates among the awardees and Massachusetts Institute of Technology was next with 41. About 90 schools were represented by one graduate each. The fellows came from 47 states and Hawaii.

The Foundation is authorized to support basic scientific research in a variety of subject fields through grants to educational, industrial, government, or other institutions, or to individuals. In general, NSF policy is to award grants to institutions for research to be carried out by specific persons. To date (mid-May) 68 research grants have been approved totalling $816,660 —an average of about $12,000 each. It is expected that further grants will be announced shortly after the June meeting of the National Science Board. Duration of the grants ranges from one to five years, the average being almost exactly two years. Research fields represented include aquatic biology, biochemistry, biophysics, chemistry, comparative physiology, developmental biology, endocrinology, engineering, enzyme chemistry, experimental embryology, experimental plant biology, genetics, immunology, microbiology, oceanography, pharmacology, photosynthesis, physics, and systematic biology. Twenty-seven states and Hawaii are represented among the 68 institutions which have received grants.

Research proposals are evaluated by the staff of the Foundation with the help of advisory panels of outstanding American scientists. By the first of July 1952, NSF will have in hand proposals in the amount of some $15,000,000. Because of fund limitations at least $7,000,000 worth of high quality proposals will probably be carried over into fiscal 1953.

NSF also is providing substantial support for a number of other projects which fall for the most part in the scientific information and education fields. One of these is an investigation of requirements for an improved Russian-English scientific dictionary. This study is being carried on under a Foundation grant to Columbia University with V. Rojansky, professor of physics at Union College serving as director. He is being assisted by a steering committee set up by Columbia and composed of I. I. Rabi, Columbia physics department; Phillip E. Mosely, Columbia Russian Institute; E. Simmons, Columbia Slavic languages department; and John Turkevich, Princeton chemistry department and director of the Brookhaven *Guide to Russian Periodical Literature*.

Another project, now well started, can be thought of as an inventory of physiology as a science. This program, which was proposed by the American Physiological Society, will have for its objective the determination of the state of physiology as a science with such factors being studied as its present and potential research facilities, its trained manpower resources, and its relationship to the rest of science and to the national welfare. The Foundation looks upon this investigation as a kind of pilot project which may lead to similar studies in other fields. Taken together, investigations of this type will aid greatly in providing the kind of background needed by the Foundation in formulating a national policy in science and research.

Two existing projects whose support has been assumed by the Foundation are the Interdepartmental Committee on Scientific Research and Development and the National Scientific Register. The former was created by the President in 1947 and is made up of members from the departments of Agriculture, Interior, Commerce, State, Defense, Army, Navy, and Air Force, the Federal Security Agency, the Atomic Energy Commission, the National Advisory Committee for Aeronautics, the Veterans' Administration, the Smithsonian Institution, and the National Science Foundation. The Interdepartmental Committee serves as a mechanism for gathering and consolidating the opinions of the various member agencies interested in federally-supported research and development with a view to increasing the effectiveness and efficiency of all their programs. NSF took over support of this committee beginning with fiscal 1951.

The National Scientific Register of scientists was organized in 1950, temporarily in the Office of Education, in line with recommendations made by the National Security Resources Board. It is concerned primarily with the development and maintenance of an up-to-date inventory of selected groups of U. S. scientists for use in the event of all-out war and as a basis for analytical studies in the general field of scientific and technical personnel. Responsibility for supporting the project was taken over by the Foundation beginning with fiscal 1952.

Other NSF activities now under way include the emergency support being given the *Physical Review*, participation along with six other agencies in providing emergency assistance to *Biological Abstracts*, publication of results of the AAAS Symposium on Soviet Science held in Philadelphia last December, and some support of travel of U. S. scientists to attend international conferences. In connection with the last, travelling expenses of delegates to the First General Assembly of the International Mathematical Union in Rome were paid by NSF and similar funds will be provided for several attendants at the forthcoming International Biochemistry Congress to be held in Paris this summer.

The facts presented above leave no doubt but that NSF has made substantial progress during its first year of operation. They indicate clearly that the Foundation's several major programs are firmly established and ready to expand to vastly greater effectiveness as rapidly as funds up to the full original authorization can be made available. At present, however, the financial horizon for fiscal 1953 is unchanged from that of 1952. In the Independent Offices Appropriation bill, the House of Representatives Committee stated, "The bill includes $3,500,000 for salaries and expenses of this activity which is the amount provided for the current fiscal year and is $11,500,000 below the budget estimate. The committee is aware of the importance of this activity and the program which it sponsors and it is reluctant to retard the development of it. However, it is a new activity which is unlikely to provide assistance to the country in the immediate emergency. The committee feels, therefore, that expansion to the full amount of the authorization ($15,000,000) should be deferred until the financial condition of the Treasury has improved."

Short-sighted as this reasoning must appear to anyone who at all recognizes the extent to which applied research and development depend upon and lag behind the parent fundamental research, it is encouraging to note that a motion was made on the floor of the House by Representative Priest of Tennessee, supported strongly by Representatives Frank E. Smith of Mississippi and Javits of New York, to raise the appropriation to $10,000,000. This was defeated, however, and the bill was passed by the House as reported. Senators Alexander Smith of New Jersey and Hubert Humphrey of Minnesota at their own request appeared on behalf of the Foundation during hearings before the Senate Appropriations Committee.

Books

The Ether

A History of the Theories of Aether and Electricity. The Classical Theories. By Edmund Whittaker. 434 pp. Philosophical Library, Inc., New York, 1951. $12.00.

This work covers the significant developments in dynamics and electromagnetics (broadly speaking) from the age of Descartes to that of Lorentz, or roughly from 1600 to 1900; it ends, rather abruptly, with the prenatal stirrings of relativity and quantum theory. This edition, the first of two volumes, is a revised and enlarged version of one that appeared originally in 1910; the second volume will continue the account to the present time.

The author's viewpoint, which appears primarily in the preface—the text itself being a heuristic exposition —is best expressed in his own words:

> "As everyone knows, the aether played a great part in the physics of the nineteenth century; but in the first decade of the twentieth, chiefly as a result of the failure of attempts to observe the earth's motion relative to the aether, and the acceptance of the principle that such attempts must always fail, the word 'aether' fell out of favour and it became customary to refer to the interplanetary spaces as 'vacuous'; the vacuum being conceived as mere emptiness, having no properties except that of propagating electromagnetic waves. But with the development of quantum electrodynamics, the vacuum has come to be regarded as the seat of the 'zero-point' oscillations of the electromagnetic field, of the 'zero-point' fluctuations of electric charge and current, and of a 'polarization' corresponding to a dielectric constant different from unity. It seems absurd to retain the name 'vacuum' for an entity so rich in physical properties, and the historical word 'aether' may fitly be retained."

The book is a comprehensive, well documented, scholarly work with an author index that approaches perfection and an extremely useful table of contents in which the individual chapters are broken up to detail their highlights. The lucid expository style and the detailed development are well suited to the material; would that the same had been employed in his *Treatise on Dynamics*, particularly the "illustrative" examples. The reviewer strongly recommends the book to all physicists; to those working in electromagnetics with knowledge of their subject derived solely from current texts and articles the material will come as a revela-