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SUMMARY STATEMENT OF ACTIVITIES OF THE NATIONAL RESEARCH COUNCIL, 1936–1937

By Dr. LUDVIG HEKTOEN, Chairman, and Dr. ALBERT L. BARROWS, Executive Secretary

THE following brief account of certain of the operations of the National Research Council during the past fiscal year, 1936–37, is issued this fall, since the full account of the Council's work in its annual report will not be available until the publication of the Annual Report of the National Academy of Sciences next spring.

The organization of the Council gives it now about 240 members, with an additional group of about 785 committee members. There is a body of over 600 past members to whom the Council still turns on occasion for advice and assistance. The scientific and technical societies and institutions associated with the Council through representation in membership number 81, exclusive of the scientific bureaus of the Federal Government which are represented in the Council by Presidential appointment. On the calendar of the Council there were listed last year as in progress under special committees over 80 active projects of varying nature and significance. It will be possible at this time, however, to refer to but a few of these in the following paragraphs.

FELLOWSHIPS

This year has marked a change in the method of administration for the post-doctorate fellowships of the National Research Council, which have been supported since 1919 by funds provided by the Rockefeller Foundation. In order to effect economies of administration, two of the former boards of the Council representing the physical sciences and the biological sciences have been consolidated into a single board of five members, the National Research Fellowships Board in the Natural Sciences. The Medical

Fellowship Board, however, also of five members, will be maintained as formerly. The new fellowships board will continue the previous fellowships policy of the Council on substantially the same basis as heretofore, but, by special arrangement with the Rockefeller Foundation, will award fellowships in geology and physical geography as well as in chemistry, physics, mathematics, biology, anthropology and psychology. In the selection of fellows the new board will be assisted by special standing fellowships committees in the five technical divisions of the Council concerned, and these committees have been appointed so as to conserve the experience of the Council in the administration of fellowships.

Last spring the fellowship applications received totalled 173 by the National Research Fellowships Board in the Natural Sciences and 58 by the Medical Fellowship Board. From these the two boards made 14 reappointments and 35 new appointments for the academic year 1937–38. Of these appointments the total number in the medical sciences is 14. The prospect is that somewhat fewer appointments can be made for the following year, but the Council looks forward to the continuation of a considerable number of fellowships each year.

There are now over 1,100 past fellows of the Council. Of these about one quarter used their fellowships for study abroad and have returned to the United States. Over three quarters of all the past fellows are engaged in educational and research institutions. About five eighths of those engaged in academic work are already of professorial grade, and some of the students of these past fellows are themselves beginning to apply for fellowships. A number of past fellows of the Council have been recognized as outstanding scientific men through subsequent fellowship and research appointments, and through the receipt of prizes and awards.

Grants-in-Aid

The system of general grants in aid of research which the Council has maintained for the past eight years with funds supplied by the Rockefeller Foundation will be terminated with the current year, except that in the medical sciences there remains a sum of a few thousand dollars which will be available for the support of research on medical problems until the end of the calendar year 1937.

From these appropriations about 750 grants have been made for the individual support of research in sums averaging less than $600 each. About $30,000 has also been used for conferences during the period, and $15,500 for certain cooperative projects of the Council.

It is felt that this fund has served many useful purposes in meeting certain needs which were almost of the nature of an emergency, in augmenting and capitalizing other research resources so as to accomplish additional progress, in bridging gaps in which research projects might have lapsed or the interest of an investigator might have languished, and in lending assistance and encouragement to investigators by calling attention to the merit or promise of their work. However, a number of other funds from which grants in aid of research may be made are now available through other organizations, and in general the funds available for the support of research in this way are both larger than ever before and better known than formerly. This steady strengthening of the sinews of scientific work is a matter of deep gratification to the Council.

Scientific Aids to Learning

Among the projects of the Council newly undertaken during the year is a study of the adaptation of certain modern scientific developments as aids to learning, not only in the formal educational system of the schools, but for purposes of adult education and for the reliable information of the public at large. Among these possibilities are the utilization of the radio both for schoolroom use and for public broadcasting; motion-pictures, with special reference to classroom instruction, field and laboratory observations and other uses; television; increased utilization of the phonograph in educational work; and improved forms of documentation. The possibilities for aiding the deaf and the blind by certain of these developments are also very great.

During the past 400 or 500 years the dissemination of knowledge has been mainly dependent upon the printed page, which in turn was a tremendous gain over the written and spoken word to which education as well as all forms of communication had previously been limited. The educational possibilities of these newer developments in science and technology seem to be almost immeasurable in the extension of the uses which have been made of printing. The adaptation of these mechanical devices, however, for the imparting of knowledge successfully and without waste seems to require thoroughgoing studies of the characteristics of these inventions, of their relationship to social usages and of the perceptive processes of the human mind.

Supported by funds from the Carnegie Corporation, the National Research Council has appointed a Committee on Scientific Aids to Learning, which has taken offices in New York City and which with the assistance of a director on full time will attempt to clarify the bases for the educational utilization of these scientific and technological aids and to formulate a program of investigations leading to their suitable and more extended use.

BORDERLAND PROBLEMS

For the past two years the Council has been interested in certain borderland problems lying "in between" the regular disciplines in the major fields of science. Two movements for the coordination of borderland research have resulted. One of these consisted of a series of conferences held by an interdivisional committee of the Divisions of Geology and Geography, Chemistry and Chemical Technology and Physical Sciences for the consideration of problems in the field of geology on which attack must be made by means of the methods of physics and chemistry. Several lists of borderland problems have been compiled relating to phase equilibrium, the deposition of minerals in the colloid state, radio activity, differential pressures, the physical constants of geological materials, rock deformation, hydrodynamics and geophysics. A statement of these problems recently published in SCIENCE (April 9, 1937, pages 361–362) invites advice and comment as to the further development of these problems as well as suggestions as to the location of facilities which can be brought to bear upon them. It is planned later to publish a more extensive report defining the status of a number of the problems as starting points for further investigations. A study has also been made of the problems common to the fields of physical geology, stratigraphy, paleontology and geography, which seem to have a particularly important bearing at this time. This summary has been published in mimeograph form.

The second general subject for borderland discussions was represented by a series of conferences held for the consideration of problems involving the life sciences, medicine, biology, anthropology and psychology. In these conferences it was suggested that in view of the growing concern over nervous and mental diseases, special attention be given to the subject of experimental neuroses as a critical point of attack in this field, with the result that plans are under way for the development of a program of coordinated work on certain basic problems of neurosis.

INTERNATIONAL RELATIONSHIPS

The National Research Council was represented this year at the triennial General Assembly of the International Council of Scientific Unions which met in London between the dates April 26 and May 4, 1937, by three delegates: Wallace B. Donham, dean of the Graduate School of Business Administration of Harvard University; Louis W. Hackett, of the Rockefeller Foundation, at present engaged in malaria investigations in Italy; and W. A. Noyes, Jr., professor of chemistry in Brown University.

One of the principal results of this meeting was the completion of a cooperative arrangement between the International Council of Scientific Unions and the Intellectual Cooperation Organization of the League of Nations, and a formal agreement covering this arrangement was signed by the presidents of these two bodies at a joint meeting of the Executive Committee of the International Council and the Scientific Experts Committee of the Intellectual Cooperation Organization in Paris on July 9 and 10.

Under this arrangement the International Council of Scientific Unions is to act as an advisory agency to the Intellectual Cooperation Organization of the League. The Intellectual Cooperation Organization is to consult the International Council on all scientific questions referred to it, and the Council is, in turn, to advise with the Intellectual Cooperation Organization upon all international questions affecting the organization of scientific work. A representative of each body will attend the major meetings of the other body. The International Council is to appoint committees in accordance with its usual procedures to study questions on which these two bodies are to collaborate. The manner in which practical work is to be carried out is to be determined in each case by mutual agreement, with the International Council remaining free to take such steps as it considers appropriate in any case in which the Intellectual Cooperation Organization does not act. The executive organs of the Intellectual Cooperation Organization will provide the secretariat for technical committees appointed under this agreement and will meet the cost of certain committee meetings. It is understood also that this cooperation is to be extended through the International Council to the several international unions affiliated with it.

At a joint meeting in Paris last July several matters of cooperation were considered, including a study of the scientific program of the Intellectual Cooperation Organization; steps for practical cooperation with the scientific unions in the appointment of coordinating committees and the publishing of reports of progress in the major fields of science; the preparation of scientific bibliographies, particularly for those languages not written with Roman characters; and the holding of "scientific conversations, the first of which will deal with the general consequences of deep alterations that have taken place in physics concerning the principles of the explanation of natural phenomena." The Scientific Experts Committee has also reviewed the program of the International Council and has studied several proposals recently received by the Intellectual Cooperation Organization, among which were a plan for the publishing of old scientific manuscripts and means for the coordination of investigations upon physical constants.

WASHINGTON BIOPHYSICAL INSTITUTE

This year it has been possible to carry into effect a plan proposed some years ago for the encouragement of quantitative studies in biology and the significance of physical phenomena in life, and the development of special apparatus for aiding such studies, involving also the adaptation of methods and instruments of research in the physical sciences for use in biological investigations. To this end the Washington Biophysical Institute has been set up in Washington, D. C., and has begun its operations supported in part by a grant from the Rockefeller Foundation and in part by substantial cooperation by the National Bureau of Standards and the National Institute of Health. The work of the Biophysical Institute at first is being directed toward the development of special apparatus, including a near-infra-red recording spectrometer with glass prisms, a salt prism infra-red spectrograph and auxiliary equipment for use with the standard ultra-violet spectrograph in quantitative absorption analyses.

EUROPEAN LABORATORIES TOUR

Under auspices of the Division of Engineering and Industrial Research of the Council a special tour was arranged this summer to enable industrial and financial executives of the United States to visit government, university and industrial laboratories in European countries. The party contained about twenty-five members. The visits were arranged through the courtesy of the Department of Scientific and Industrial Research in England, the Verein Deutscher Ingenieure in Germany and the Under Secretary of Scientific Research in France. Members of the tour have returned impressed by the strong momentum of scientific research in Germany under the stimulus of governmental directive and national esprit, the close and successful relations between the Government and industry in England in matters of research and the significance of the recent establishment of the office of Under Secretary for Scientific Research in the Department of Foreign Affairs in France and of the initial appropriation of 10,000,000 francs for the support of research under the supervision of this new office of the government.

FILMSLIDE INVESTIGATIONS

The work conducted for some years at the National Bureau of Standards, which has been supported by grants from the Carnegie Corporation and for which the Council's Division of Chemistry and Chemical Technology has maintained an advisory committee, changed in character last year after certain definite results had been reached in regard to the optimum conditions for the storage of library materials, and investigations were undertaken upon the deterioration of photographic film which is being used more and more for record purposes.

The Carnegie Corporation has continued to support this work, and funds have also been contributed by a number of manufacturing corporations. The rapidly increasing use of film for record purposes in libraries and by record agencies of many kinds intensifies the importance of these investigations. In this connection may be mentioned, also, the interest which the Council has had in the organization of the American Documentation Institute under the auspices of Science Service, which is to develop further the use of film for various types of recording and publication.

HIGHWAY RESEARCH

Since 1921 the National Research Council has been under contract with the Bureau of Public Roads to render services in the encouragement and coordination of research in the highway field. For this purpose the Council maintains a Highway Research Board which has numerous contacts with state highway commissions, with engineering departments in educational institutions and with corporations dealing in highway construction materials and road-making machinery.

The sixteenth annual meeting of the board was held in Washington, D. C., on November 19 and 20, 1936, with an attendance of over 400, representing various sections of the United States, and with delegates also from Canada and Mexico. Committee reports and research papers were presented at this meeting relating to highway design, materials and construction, highway maintenance, highway finance and administration, highway transportation economics and traffic surveys and traffic control. A special symposium was included upon soil stability as the basis of durable road construction.

In addition to the encouragement of work upon highway planning and construction, the Bureau of Public Roads last winter requested the Highway Research Board to undertake a study of highway safety and provided special funds for this purpose. A preliminary report was prepared for the bureau early in the summer upon the uniformity of state motor vehicle laws, the characteristics and habits of automobile drivers and means for identifying dangerous drivers, and improved methods of reporting accidents, which are fundamental to further study of accidents and their prevention. These studies are to be continued during the coming year.

ENDOCRINOLOGY

Last year the John and Mary R. Markle Foundation of New York requested the National Research Council to prepare a report upon the status of research in

endocrinology and the prospect for promising further investigation in this field. A special committee of the Council drew up a comprehensive and significant report on the present state of knowledge in endocrinology, and on the basis of this report the foundation has made an appropriation to the Council which will be available over a period of three years for the support of research on the physiology of the ductless glands.

The Council's Committee on Research in Endocrinology has recently awarded a portion of these funds in grants to some fifteen collaborators for the support of studies to be undertaken in cooperation with the institutions at which the grantees are located.

SEX RESEARCH

The Committee for Research in Problems of Sex has continued with strong momentum the program of research which it has been carrying forward for the past sixteen years, supported on funds supplied by the Rockefeller Foundation. For the past year this program has consisted of twenty-one projects conducted by collaborators at sixteen institutions. Many of these collaborators have been associated with the committee for several years and most of their projects will be included in the program of the committee for the coming year. The work of several former collaborators with the committee is now being supported directly by the Rockefeller Foundation or by other means.

Very great advances have been made in this subject during the period covered by the Council's committee. Not the least of the contributions in this advance which the committee may have assisted in making is felt to be the development at a score of institutions about the country of strong centers for research in this field. The collaborators with the committee have themselves published about 900 papers during this time. A second edition is being prepared this year of the volume compiled for the Committee in 1934 by Dr. Edgar Allen upon "Sex and Internal Secretions."

While in its earlier years the attention of the committee was directed mainly toward the physiological phenomena of sex and studies of the sex hormones, with the great impetus which endocrinology has now acquired it has seemed expedient for the committee to turn its efforts toward the less well-developed neural and psychological aspects of these problems.

DRUG ADDICTION

The investigations undertaken seven years ago upon the chemistry and pharmacology of narcotic drugs as a contribution toward a solution for the narcotic problem have been carried forward vigorously during the past year upon continued support from the Rockefeller Foundation. This work has been conducted under the direction of a committee of the Council in cooperation with the United States Public Health Service and the Department of Chemistry at the University of Virginia and the Department of Pharmacology at the University of Michigan. A large number of new drugs having similar chemical structures have been produced and their physiological properties have been studied. These are mainly derivatives of morphine, although a number of them have been synthesized from phenanthrene and other bases. Several of the more promising substances thus produced have been studied clinically to determine their analgesic potency and their habit-forming properties.

Most gratifying in connection with these investigations has been the generous cooperation of agencies in the federal and in state governments, and of manufacturers of pharmaceuticals, especially as a demonstration that such cooperation is possible and can lead successfully to results which are not obtainable in any other way.

PATENT POLICY

The work of the Council's Committee on Drug Addiction just mentioned is of special interest also as having led during the past year to the practical solution of one of the important administrative problems which the National Research Council has met involving the proper disposition of the patentable results of scientific work sponsored by the Council. The policy of the Council with respect to the possible patenting of results of work conducted under its auspices is "to dedicate to the use of the public, in such manner as the Research Council may deem most effective, the results of such discoveries as are made in the course of investigations conducted under the auspices of the Research Council."

In the development of new narcotic drugs it soon became evident that some form of control over their manufacture must be provided. To accomplish this it was felt to be essential to take out patents on dihydrodesoxymorphine-D and several other substances resulting from the work of the Council's committee, and in the United States it has been found possible to assign these patents to the government, thus effecting a control over them in this country, since these substances clearly come under the federal narcotic laws. In order to extend this control abroad, the Research Corporation of New York, at the request of the Research Council, has applied for patents in several countries.

There are certain substances also being developed by the committee which do not fall under the jurisdiction of the narcotic laws, but which, nevertheless, ought to be controlled as to standard and distribution in the interests of the public. Patenting these sub-

stances appears to be the only recourse, and the Council plans to assign to the Research Corporation or other suitable agency patents on such substances as should be thus controlled.

Radiation Research

The Committee on Radiation for the past eight years has been encouraging research upon the biological effects of various types of radiation (x-rays, ultraviolet light, infra-red rays, radium emanations, etc.). It has been gratified in having been able to bring to bear in this field resources not only of appropriations from certain of the foundations, but also the loan or donation of apparatus and supplies, representing in the aggregate large amounts, from a number of instrument makers and manufacturers. These have been made available to collaborators at universities and research institutions, but in doing so the committee has followed the policy of not attempting to furnish continuing support of a given program of investigation indefinitely, but rather of expecting that institutional provision will be made for the continuation of promising programs of investigation after initial assistance from the committee. During the past year the committee has thus supported thirteen projects carried forward from the previous year and nine new projects, with grants of moderate amounts, and has also arranged for the loan by manufacturers of x-ray apparatus to investigators in ten or twelve cases and for the loan of radioactive substances.

A special enterprise of the committee has been brought to completion during the year in a scrutiny of the problem of mitogenetic radiation. The conclusion from the present study is in general that present methods fail to demonstrate positively the existence of mitogenetic emanations, and that further productive work in this field must depend upon the development of more sensitive instruments and perhaps new methods of approach. (A report upon these investigations has just been published by the Council as *Bulletin No. 100,* August, 1937.)

These examples present some account of the nature of the activities in which the National Research Council has been engaged, but it is recognized that whatever value there may be in any of these operations is really due to contributions of time and counsel and effort from the scientific men of the country themselves. The Council has provided merely a mechanism to enable these men to aid their common purposes. The operation of the mechanism is in the hands of those who wish to use it. The Council is deeply grateful to all the agencies that have contributed funds for its use and to all those individual scientists who have joined in carrying out the purposes for which the Council was created.

OBITUARY

DAVID HENDRICKS BERGEY

On September 5, 1937, died David Hendricks Bergey, pioneer, scientist, scholar, teacher and friend. He was born on December 27, 1860, at Skippack, Pennsylvania. His early education was received in the public schools of Montgomery County. He went to a private school for several summers and then became a teacher in the public-school system. Dr. Bergey attended the West Chester Normal School for one session and Ursinus Academy for a term. In the spring of 1881, he began the study of medicine in the office of Dr. Samuel Wolfe, of Skippack, and in the fall of the same year he entered the Medical Department of the University of Pennsylvania. He was graduated from it in 1884, receiving the degrees of bachelor of science and doctor of medicine.

Dr. Bergey practiced medicine in North Wales, Pennsylvania, from June, 1884, to October 1, 1893. Then he began his long and faithful service to the University of Pennsylvania. On November 6, 1894, he was appointed Thomas A. Scott fellow in hygiene in the Laboratory of Hygiene of the university. During that year he received the degree of master of arts in science and philosophy from Illinois Wesleyan University. Dr. Bergey then served successively in the Laboratory of Hygiene as assistant in chemistry, 1895–96; first assistant, 1896–1928; director *pro tem* of the School of Hygiene and Public Health, 1928–29; director of the Laboratory of Hygiene, 1929–31, and director *pro tem* of the Laboratory of Hygiene, 1931–32.

In the School of Medicine of the University of Pennsylvania he was appointed assistant professor of bacteriology in 1903. In 1916 the degree of doctor of public health was conferred upon him by the university. From that time until his retirement on June 30, 1931, he served as assistant professor of hygiene and bacteriology, 1916–26; professor of hygiene and bacteriology, 1926–31, and director of the Department of Hygiene, 1929–31. He was recalled from retirement to become acting professor of hygiene for the school year 1931–32. Dr. Bergey also held the position of professor of hygiene and bacteriology in the Graduate School of the University of Pennsylvania, 1928–32.

His services at the university were interrupted during the world war while serving in the armed forces of his country from 1917–1919. He was appointed as a first lieutenant in the Medical Reserve Corps,