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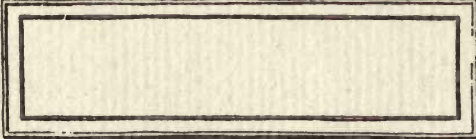


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*33 West Thirty-ninth Street  
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## Report on the Origin Foundation and Scope of the National Research Council



Publication

Number 1

27 February, 1917.

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REPORT TO THE ENGINEERING FOUNDATION ON THE  
ORIGIN FOUNDATION AND SCOPE OF THE  
NATIONAL RESEARCH COUNCIL

27 February, 1917

To the Engineering Foundation Board:

Gentlemen,

The Engineering Foundation is at present devoting the services of its secretary and substantially its entire resources to the purposes of the National Research Council, and at the request of the Chairman of The Engineering Foundation I, therefore, present this report covering briefly the organization of the National Research Council, the work upon which it has already embarked, and the work it purposes for the future.

The conception of the National Research Council is due to Dr. George Ellery Hale. He had previously organized the International Union for Co-operation in Solar Research, and taken part in the work of other international co-operative organizations. As a result of his recent visit to Europe, he had also secured full information of the steps that are being taken in England and in France in co-ordinating and mobilizing the activities of scientific men for the purposes of war.

The National Academy of Sciences afforded a natural means of inaugurating a broad movement for co-ordinating the research activities of this country in all fields of science and engineering. This Academy, as is well known was chartered during the Civil War by the Federal Government, and is the only scientific body in the United States having a federal charter. Its charter provides that it shall be the advisor of the Government in scientific matters. During the last fifty years, the Government has called upon it many times for reports upon scientific questions. Some of these have dealt with matters of great importance, such as the recent report on the geology of the Panama Canal.

Dr. Hale saw that to follow scientific research in all its ramifications, it is necessary to be in close communication not only with the educational institutions of the country, but also with the many government departments that conduct research,—and more than this, possibly most important of all—to be in touch with the great industrial establishments that conduct research. He accordingly proposed that the National Academy should initiate a movement in the interest of preparedness, using this term in its broadest sense, and that various other societies and scientific organizations, particularly the national engineering societies, should be invited to co-operate with the Academy in the inauguration of the work. Candid assurances of the co-operation of the engineers were obtained through conferences with Mr. Dunn, Dr. Pupin and members of our Board, and with Dr. Carty and other prominent representatives of the national engineering societies.

At its annual meeting in April, the Academy offered its services to the President of the United States. The President, in accepting the offer,

requested that all the research facilities of the country, including those of the Government, of educational institutions and research foundations, and of industrial research laboratories, be brought into co-operation in the national interest.

The first step taken was the appointment of an Organizing Committee consisting of Dr. Hale, as Chairman, and E. G. Conklin, Professor of Zoology at Princeton University, Simon Flexner, Director of the Rockefeller Medical Institute, Robert A. Millikan, Professor of Physics, University of Chicago, and Arthur A. Noyes, Professor of Chemistry at Massachusetts Institute of Technology. This Committee canvassed the subject thoroughly, holding conferences with many important scientific bodies and with a number of the engineering bodies,—particularly with the presidents of the engineering societies. Conference was also had with the scientific bureaus of the government, with the organizations of the physicians and surgeons, with the Naval Consulting Board, and many other organizations devoted to science, both on the industrial and educational sides. It particularly was kept in mind that the Council should not alone consider promotion of researches bearing upon military problems, but that true preparedness would best result from the encouragement of every form of research, whether for military or industrial application, or for the advancement of knowledge without regard to its immediate practical bearing.

After considering many plans, the Organizing Committee reported to the National Academy of Sciences the following recommendation:

"That there be formed a National Research Council, whose purpose shall be to bring into co-operation existing governmental, educational, industrial, and other research organizations with the object of encouraging the investigation of natural phenomena, the increased use of scientific research in the development of American industries, the employment of scientific methods in strengthening the national defense, and such other applications of science as will promote the national security and welfare.

"That the Council be composed of leading American investigators and engineers, representing the Army, Navy, Smithsonian Institution, and various scientific Bureaus of the Government; educational institutions and research endowments; and the research divisions of industrial and manufacturing establishments.

"That, in order to secure a thoroughly representative body, the members of the Council be chosen in consultation with the presidents of the American Association for the Advancement of Science, the the American Philosophical Society, the American Academy of Arts and Sciences, the American Association of University Professors, and the Association of American Universities; that representatives of industrial research be selected with the advice of the Presidents of the Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Society of Electrical Engineers, and the American Chemical Society, and that members of the Cabinet be asked to name the representatives of the various Departments of the Government.

"That Research Committees of two classes be appointed, as follows: (a) Central committees, representing various departments of science, comprised of leading authorities in each field, selected in consultation with the president of the corresponding national society. (b) Local committees in universities, colleges and other co-operating institutions engaged in scientific research."



This scheme of organization was reported to the President of the United States, and was approved by him on July 24th, 1916, in the following letter:

WASHINGTON, D. C., July 24th, 1916.

DR. WILLIAM H. WELCH,  
*President of the National Academy of Sciences, Baltimore, Maryland.*

MY DEAR DR. WELCH:

I want to tell you with what gratification I have received the preliminary report of the National Research Council, which was formed at my request under the National Academy of Sciences. The outline of work there set forth and the evidences of remarkable progress towards the accomplishment of the object of the Council are indeed gratifying. May I not take this occasion to say that the Departments of the Government are ready to co-operate in every way that may be required, and that the heads of the Departments most immediately concerned are now, at my request, actively engaged in considering the best methods of co-operation.

Representatives of Government Bureaus will be appointed as members of the Research Council as the Council desires.

Cordially and sincerely yours,

[Signed]            WOODROW WILSON.

The object of the Research Council is, in its broadest terms, the promotion and furtherance of scientific research and therefore the personnel of the Research Council had to be selected to reach educational institutions, technical, scientific and medical, the government departments, and the industries. This matter therefore was of importance and careful consideration was given to it.

There are at present forty-seven members of the Research Council; of these about twenty are appointed from the National Academy of Sciences and other National Scientific bodies as the most distinguished representatives of their several departments of science; eight or ten have been appointed by the President at the request of the Organizing Committee to represent the departments of the government interested in scientific research, and the remainder have been appointed largely at the instigation of The Engineering Foundation and its officers, after consultation with the presidents of the great engineering societies, to represent the engineers of the country.

It seemed so important to The Engineering Foundation that this work of research should be undertaken actively that, upon the representations of Mr. Dunn and Prof. Pupin, the Foundation voted to devote the services of its secretary and substantially its entire resources to National Research Council. The purpose of the Foundation Board is to administer the income of Mr. Swasey's generous gift and other gifts in the furtherance, of "research in science and engineering" and for other purposes. Therefore, the Foundation Board could see no better use for its funds at this time than to promote the ends of the Research Council. In this view Mr. Swasey cordially agreed and gave an additional five thousand dollars to the Engineering Foundation for the first year of the Council's work.

To sum up briefly then, the National Research Council has been formed, at the request of the President of the United States, by the

President of the National Academy of Sciences, in order to further scientific research in its broadest aspects.

The meeting to organize the Council was held on 20 September, 1916, in the Engineering Societies' building. There were present at this meeting nearly all of the following gentlemen, all of whom had been requested by the President of the National Academy of Sciences to become members of the Council. Their acceptance of the invitation constituted them members of the Council.

- LEO H. BAEKELAND, Past President, American Electrochemical Society.  
 MARSTON TAYLOR BOGERT, Professor of Organic Chemistry, Columbia University.  
 JOHN A. BRASHEAR, Past President, American Society of Mechanical Engineers.  
 WALTER B. CANNON, Professor of Physiology, Harvard Medical School.  
 JOHN J. CARTY, Chief Engineer, American Telephone & Telegraph Co.  
 RUSSELL H. CHITTENDEN, Director, Sheffield Scientific School, Yale.  
 JOHN M. CLARKE, Director, State Museum, Albany, N. Y.  
 HOWARD E. COFFIN, Member, Advisory Commission to Council of National Defense.  
 EDWIN G. CONKLIN, Professor of Zoology, Princeton University.  
 JOHN M. COULTER, Professor of Botany, University of Chicago.  
 WILLIAM CROZIER, Chief of Ordnance, U. S. A.  
 WILLIAM M. DAVIS, Professor of Geology, Harvard University.  
 GANO DUNN, President, The J. G. White Engineering Corporation.  
 RALPH EARLE, Chief, Bureau of Ordnance, U. S. N.  
 SIMON FLEXNER, Director, Rockefeller Medical Institute.  
 JAMES D. GATEWOOD, Medical Director, Naval Medical School.  
 WILLIAM C. GORGAS, Surgeon-General, U. S. A.  
 W. F. M. GOSS, Dean of Engineering, University of Illinois.  
 ROBERT S. GRIFFIN, Engineer in Chief, U. S. N.  
 GEORGE E. HALE, Director, Mt. Wilson Solar Observatory.  
 CLEMENS HERSCHEL, President, American Society of Civil Engineers.  
 WILLIAM H. HOLMES, Curator, United States National Museum.  
 HERBERT CLARK HOOVER, Chairman, Commission for Relief in Belgium.  
 W. W. KEEN, President, American Philosophical Society.  
 VAN H. MANNING, Director, Bureau of Mines.  
 FRANKLIN H. MARTIN, Member, Advisory Commission to Council of National Defense.  
 CHARLES F. MARVIN, Chief, United States Weather Bureau.  
 A. A. MICHELSON, Director, Ryerson Physical Laboratory, University of Chicago.  
 ROBERT A. MILLIKAN, Professor of Physics, University of Chicago.  
 E. H. MOORE, Professor of Mathematics, University of Chicago.  
 ARTHUR A. NOYES, Director, Research Laboratory of Physical Chemistry, Massachusetts Institute of Technology.  
 RAYMOND PEARL, Biologist, Maine Agricultural Experiment Station.  
 E. C. PICKERING, Director, Harvard College Observatory.  
 MICHAEL I. PUPIN, Professor of Electro-Mechanics, Columbia University.  
 CHARLES F. RAND, President, United Engineering Society.  
 THEODORE W. RICHARDS, Director, Wolcott Gibbs Memorial Laboratory, Harvard University.  
 C. E. SKINNER, Engineer of Research Division, Westinghouse E. & M. Co.  
 GEORGE O. SQUIER, Chief Signal Officer, U. S. A.  
 S. W. STRATTON, Director, Bureau of Standards.  
 AMBROSE SWASEY, Past President, American Society of Mechanical Engineers.  
 DAVID W. TAYLOR, Chief Constructor, U. S. N.  
 ELIHU THOMSON, Past President, American Institute of Electrical Engineers.  
 C. R. VAN HISE, President, American Association for the Advancement of Science.  
 VICTOR C. VAUGHAN, Director, Medical Research Laboratory, University of Michigan.



CHARLES D. WALCOTT, Secretary, Smithsonian Institution.  
WILLIAM H. WELCH, President, National Academy of Sciences.  
W. R. WHITNEY, Director, Research Laboratory, General Electric Co.

These comprise the Council at this time. Others will be added from time to time as the work develops.

Dr. Hale was made permanent chairman, Dr. Charles D. Walcott, first vice-chairman, and Mr. Gano Dunn, second vice-chairman, and Dr. Hutchinson, who had already been appointed Secretary of the Engineering Foundation, was, by agreement with the National Academy of Sciences, made Secretary of the National Research Council. This was part of the understanding between the Research Council and the Engineering Foundation.

The Research Council authorized Dr. Hale, the chairman, to appoint an Executive Committee to consist of ten members, in addition to the President of the National Academy of Sciences, the chairman, and the two vice-chairmen of the National Research Council, who were to be members of the Executive Committee, ex-officio. Dr. Hale has appointed the following members of the Executive Committee: J. J. Carty, Russell H. Chittenden, Edwin G. Conklin, Gano Dunn, Robert A. Millikan, Arthur A. Noyes, Raymond Pearl, M. I. Pupin, S. W. Stratton, Victor C. Vaughan.

Since the first meeting of the Research Council, the work has been carried on by the Executive Committee of the Council, which has held twelve meetings. The outcome of these meetings is principally the appointment of a number of committees to report upon and organize research in different branches of science; the three principal committees, next in importance to the Military Committee, are on "The Census of Research" with Dr. Stratton of the Bureau of Standards as Chairman; on "Research in Educational Institutions" with Dr. Hale as Chairman; and on "Research in Industrial Institutions" with Dr. J. J. Carty as Chairman.

The Committee on Educational Research, under Dr. Hale's direction, has suggested the appointment of a Research Committee to promote research in each approved educational institution in the country. This committee will make recommendations for the better conduct of research in the different educational institutions, and particularly for the elimination of lost motion, and it will keep the various institutions informed of what is going on in other institutions.

Dr. Hale has already succeeded in securing donations for three or four research fellowships, yielding one thousand dollars each a year, and also a gift of two hundred thousand dollars for research to the Throop College of Technology at Pasadena.

The Committee on Census of Research, acting under Dr. Stratton, is preparing to make a census of all research men and materials in the United States. Dr. Stratton will work along with the Committee on Educational Research, but the results of the census will be co-ordinated and tabulated by Dr. Stratton's Committee.

The promotion of industrial research, an undertaking of greatest importance, is under way at the direction of Dr. Carty for the Committee on Research in Industrial Institutions. Dr. Carty, so far, has made

no report of the steps taken by him, for the reason that his work is of a rather confidential nature. The handling of the subject in industrial institutions is somewhat delicate, owing to the fact that each institution must, of necessity, keep secret the means it has devised for the bettering of its own product. Dr. Carty is endeavoring to devise means by which the smaller industries can have the advantage of scientific research, through some scheme of co-ordination, and the employment of some existing research means for the purpose of doing the work itself.

These three may be considered the principal general committees already appointed, but in addition to these, the Nitrate Supply Committee under Dr. A. A. Noyes, has done noteworthy work. The members of this committee are the leading men in their specialties in the country. They have been asked to advise the Government regarding the expenditure of twenty million dollars that Congress has appropriated for the purpose of providing a supply of nitrates; hence, the work of this committee has an immediate practical bearing.

The Council has appointed committees in many of the various branches of science. The first of these is the Chemistry Committee, of which Dr. Marston Taylor Bogert of Columbia, is Chairman. This is a general Chemistry Committee, and it is intended to have sub-committees in many divisions of chemistry. Dr. Bogert is organizing this committee on a broad scale, and it has already been consulted by the Government for advice on explosives.

In order to serve the research requirements of our military establishments, there has been organized a Military Committee of the Research Council, composed of three representatives of the Army, General Gorgas, General Crozier and General Squier, the heads respectively of the Medical, Ordnance, and Aviation Departments of the Government, of four representatives of the Navy, Admiral Taylor, Admiral Griffin, Admiral Earle and Dr. Gatewood, the heads respectively of the Construction, Engineering, Ordnance and Medical Department of the Navy, and of the heads of certain civilian bureaus of the Government; this section will operate more or less independently.

Important also are the Census Committee and the Engineering Committee. The Census Committee is engaged in making a complete enumeration of the research men in the universities, in government bureaus, and the industrial research laboratories, and of the facilities for research work. This is under the direction of Dr. Stratton of the Bureau of Standards; the Committee comprises the chairmen of the science committees of the Council.

The Engineering Committee will be composed, at the outset, of the members of the Research Council who are engineers; their function will be mainly advisory with respect to engineering questions that arise in connection with research problems under investigation.

In addition to these committees that have been mentioned briefly, there are a number of committees, which have been appointed but are not yet in full operation. Among them are Physics, Astronomy, Mathematics, Geology and Paleontology, Botany, Zoology and Animal Morphology, Medicine, Physiology, Anthropology, Hygiene, Agriculture, Aeronautics.

The National Research Council realizes it is not the only organization engaged in the promotion of scientific research. The American Association for the Advancement of Science has for some years had a Committee



of One Hundred on Research, which has recently undertaken to do certain things in which the Research Council is also engaged. In order that there should be no duplication, one of the first steps taken by the Council was to get into communication with the proper committee of the A.A.A.S. and arrange that the two should have a number of members in common and should co-operate.

With the same end in view, the Council has established close relations with the Council of National Defense. As the Engineering Foundation may desire to be precisely informed of the constitution of the Council of National Defense, it may be well to state it briefly.

The Council of National Defense, constituted by Act of Congress, is composed of six cabinet officers, with the Secretary of War as Chairman; there is added to this Council a body known as the "Advisory Commission" to the Council for National Defense, composed of seven civilians. To this Council is given the investigation, co-ordination, and mobilization of all the means of transportation of the country, and the continuation of the work of the Committee on Industrial Preparedness of the Naval Consulting Board, all having preparation for war as the key note.

The National Research Council has made its first report, which has been transmitted by Dr. Welch, President of the National Academy of Sciences, to the President of the United States, with a letter calling the attention of the President to the accomplishment of the organization of the Research Council for the furtherance of scientific research.

Broadly speaking, the work of the National Research Council up to the present has been the formation of a number of committees. Some of these committees have already done active work, and others are in the way of getting results promptly, others still are in the course of formation. The efforts of the Council are directed to the furtherance of scientific research; its field of action is limited to this, but inasmuch as scientific research affects not only all scientific and engineering education, many government activities and all industries, it will be seen that the limitation is more seeming than real.

The policy of the Research Council is always directed towards the encouragement of individual efforts. This policy was stated at the first meeting of the Council's Executive Committee in these words:

RESOLVED: That the efforts of the Research Council shall be uniformly directed to the encouragement of individual initiative in research work, and that co-operation and organization, as understood by the Research Council, shall not be deemed to involve restrictions or limitations of any kind to be placed upon research workers.

The formation and work of the Research Council have received the endorsement of a number of scientific and technical bodies; among them, the Woods Hole Biological Laboratory, the American Association for the Advancement of Science, the American Philosophical Society, the American Institute of Consulting Engineers, and others. The Consulting Engineers invited the officers and members of the Executive Committee to a dinner at the University Club on December 18th, at which the objects of the Council were carefully explained to the members of this Society. It is thought that there will be a better understanding among the consulting engineers of the value of scientific research in their work, as a result of this meeting.

The funds of The Engineering Foundation are not being expended for research work by any of the committees appointed by the Council, the Chairmen having in most cases been able to provide themselves with funds through the generosity of friends. This is particularly the case with the Chemistry Committee and the Committee on Educational Research. The funds of The Engineering Foundation, are not sufficient to conduct research work but only to organize it. Therefore, each committee when appointed has been made to understand that it must find means to do its own work. The Research Council is thus indirectly the means of raising a considerable amount of money for the promotion of research, as each committee becomes in effect a source of supply of funds for the general objects of the Council.

The office in New York is intended to be one of the central points to which all the reports of these committees and sub-committees shall gravitate, and from which recommendations and information shall be given, as required, to the various committees. It, in conjunction with the Washington headquarters, will be the means through which the committees shall keep in touch with each other. The headquarters of the National Research Council should ultimately, and probably before long, accumulate a large amount of data on scientific research in this country, both in educational institutions, industrial establishments and in the government bureaus. These data and the services of the eminent body of scientists and engineers enlisted will inevitably be of great and increasing value and probably will lead to a notable saving in the cost of scientific research both in men and in material and to a very great increase in value and results of scientific research to the arts and industries of the United States and to the American people. The National Research Council has recognized and expressed its grateful appreciation of the financial support and services placed at its disposal by the engineers of the United States through the agency of the Engineering Foundation.

Very respectfully,

CARY T. HUTCHINSON,  
*Secretary.*



