The National Research Council and the Organization of Science
by VERNON KELLOGG of Stanford University and the National Research Council
(Reprinted from The Nation's Business, November, 1919.)

AMERICA prides itself on its genius for organization. To say that a man is a great American is almost to say that he is a great organizer. We have gone far and gained much in organizing our business, our industry, our agriculture, our labor. But strangely, we have not yet organized our science. Now is the time to do it.

Science gave a new and startling proof of its practical value, its indispensability, during the war. It was the aid of science that enabled Germany to carry on its formidable war effort as long as it did; it was science that enabled America and the Allies to overcome this effort. This is not to overlook the tremendous rôle played in the war by actual fighting, by business and industrial organization, and by moral factors, the human intent to win and national psychology and patriotism. But scientific knowledge and its application especially characterized the conduct of the whole war.

And similarly, it will be to science that the world must turn for aid in meeting the after-war problems. We shall need to draw on all we know; we shall need to know more. Knowing more will depend on a renewed and ardent pursuit of scientific effort. The application of the same principles of organization which have made a success of our business and industry will make a success of our science. And the success of our science will mean an increase of our national strength and the betterment of our national well-being.

The Great War gave a great stimulus to scientific research and application and to scientific organization. And the forward countries of the world have not failed to take advantage of this stimulus and to profit by the lesson of the war. They are moving toward the organization of science. England has established a governmental Department of Science and Industrial Research.
with an initial endowment of $5,000,000, to stimulate and support and coordinate scientific investigation for the benefit of the Empire. In addition, the Dominions, notably Canada and Australasia, have independently appropriated funds for similar work.

Japan has also established a National Laboratory for Scientific and Industrial Research, with a fund of two and one-half millions of dollars, for use during the next ten years. And Italy, despite, or perhaps because of, political and social difficulties, is also establishing a National Research Council. France is less forward in efforts along this line, although the matter is under active discussion. And, finally, America has made its step along the same line by the organization of a National Research Council, the avowed purpose of which is to mobilize the whole strength of American science for the promotion of the national well-being and the advance of science itself.

All of these efforts to promote the recognized fundamental scientific basis of national strength and well-being are out-growths of the war's revelations. The British, Japanese, and Italian foundations date from 1916 and 1917. And it is from that period also that our own National Research Council dates. The Council was established to make available to the government in its great struggle all the scientific knowledge and resources of the country.

The Government had already many strong special scientific bureaus, but there were thousands of scientific men scattered all over the land, unattached to Government service, and in their isolation and unorganized condition, almost unavailable for practical use, although eager for opportunity to help. The recognition of this fact led to the swift organization, by the initiative and through the volunteer efforts of the scientific men themselves, of the National Research Council. It was not exactly the springing up of a million men to seize arms and untrained and unled, to form a great army to save the country, but it was the voluntary offering of thousands of trained and experienced scientific investigators to put themselves and their knowledge and capacity, under proper suggestion and leadership, at the service of their country.

And they did real service. The men who know the secrets of the war know that; the responsible men of the Army and Navy will gladly testify to it. Joining their effort through the organized National Research Council with that of the scientific men already in regular government service in army, navy, and Washington bureaus, they attacked energetically and simultaneously all the pressing war-time technical problems.

Under the general direction of the Council the great centers of research throughout the country were kept occupied with government work. In more than a score of leading universities the scientific laboratories gave their entire attention to problems of military optics, of ordnance, munitions, topography, and food conservation. The Council also directed investigations relating to gun defense, dyes, high explosives, smoke screens, wireless telegraphy and telephony, substitutes, detection of submarines, testing of materials and pathological and medical problems. Associated with the Council was also the group of psychologists whose work revolutionized the methods of organizing Army and Navy personnel.

Space prevents further details of the work accomplished by the organization of American science under the stimulus of the war. One thing, however, must be noted in this connection, and that is that one of the most dismal failures of the war was made in the endeavor by all of the principal belligerent countries to utilize the inventive genius of the average citizen. One of the scientific men of America best acquainted with the inventive efforts and their failures and successes in all of the allied countries during the war, has recently written:

"Every major belligerent had a board of inventions and research to which every man with an idea was asked to communicate that idea. All of these boards had precisely the same experience, in England, France, Italy and the United States. They all agree that not one suggestion in ten thousand which came in in this way was of any value whatever, and that the occasional worth-while idea which was presented to these boards was in general arrived at earlier in other ways.

"It may then be set down as a fact fairly well established by the experience of the Great War that rapid progress in the application of science to any national need is not to be expected in any country which depends, as most countries have done in the past, simply upon the unselected inventive genius of its people to make these applications."

The lesson of the war as regards science, then, is first, that the efforts of scientific men can be greatly speeded up by a proper stimulus; second, that these efforts can be made immensely more effective and fruitful by a proper organization; and, third, that while such an organization can be encouraged and helped by the Government, it can be effected by cooperative effort among scientific men themselves.

The founding of the National Research Council is the outgrowth of this lesson. And the special characteristic—and a truly American one—which distinguishes it from the other rather similar organizations of England, Canada, Australia and Japan, and also from the already long-established government scientific bureaus of our own country is that, although officially recognized by the Government, it was not initiated or organized by it and is not supported by it. It is the outcome of a nation-wide cooperative effort of the scientific men of America, including representatives of the universities, the various special privately endowed research institutions, the scientific laboratories of the great industries and the Government scientific bureaus, and the numerous unattached specialists. And it is entirely controlled, in a thoroughly democratic way, by these many cooperating scientific investigators. It derives its support from funds contributed from private sources.
Now that the special emergency, the war-time need, is past, the Council has reorganized itself on a permanent peace-time footing and intends to try to make itself useful in connection with any of those problems of peace time, especially the larger national ones, to the solution of which science can directly contribute. Many of these problems are too many-sided for individual handling. Many of them need to be attacked simultaneously, in various parts of the country and from different angles. The cooperation of physicists, chemists and engineers is needed for a successful solution of some; of chemists and biologists for others; of geologists, geographers and meteorologists for still others, etc.

We need a great cooperative scientific investigation of food and nutrition; the National Research Council has put it under way. We need far more study on a very wide scale of the problems connected with the preparation and use of fertilizers, of ceramics, of alloy steels, of synthetic drugs. The Council has begun this study. There are great scientific problems of direct bearing on our national well-being in connection with public health and sanitation, with forestry, with intensive agriculture.

And there are many others which may not at the moment seem to have so tangible a relation to practical affairs, the solution of which may nevertheless serve as the indispensable fundamental basis for future practical use. The discovery but a few years ago by a physicist working at a problem of so-called "pure science" led to an improvement in the making of electric-light bulbs which gives us now twice the light for the same money formerly expended. It has meant a saving of millions of dollars a year to the people of the country.

The business men of this country, therefore, in whose work and success science plays much more of a part than most of them perhaps realize, ought to be interested in the aims and possibilities of the National Research Council, for the results of its work may have much significance to them.

The Council is organized primarily as a permanently constituted part of the National Academy of Sciences. The congressional charter of the National Academy provides that "the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art." Under this provision the Academy has acted since the time of its establishment as an official adviser of the Government on a wide variety of questions. At the time of its foundation during the Civil War, as the earlier records of the Academy indicate, its committees and its members dealt actively with military and naval problems of precisely the same type as those which have insistently pressed for solution during the recent war. It was thus a natural step on the part of the Academy to offer its services to the President at a time, in April, 1918, when our relations with Germany were already tense, and for the President to accept the offer and to request the Academy to organize the scientific and technical resources of the country in the broadest and most effective manner, to accomplish the objects in view.

This request from the President was accepted by the Academy, and, fortified by its charter, it took steps which soon led to the establishment of the National Research Council, without seeking additional authority. However, as the work of the Research Council progressed, it became evident that a definite formulation of its objects by the President, and an expression of his desire that it be perpetuated by the Academy and permanently assured of the cooperation of the various departments of the Government, would serve a useful purpose. The President's recognition of this fact led him to issue an Executive Order on May 11, 1918, which serves to supplement the charter of the Academy and constitutes a request for the permanent exercise of such functions as the National Research Council has been able to render.

This Executive Order so clearly and concisely defines the functions and duties of the Council that they may best be stated by direct quotation from the order, as follows:

"In general, to stimulate research in the mathematical, physical, and biological sciences, and in the application of these sciences to engineering, agriculture, medicine, and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare.

"To survey the larger possibilities of science, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects.

"To promote cooperation in research, at home and abroad, in order to secure concentration of effort, minimize duplication, and stimulate progress; but in all cooperative undertakings to give encouragement to individual initiative, as fundamentally important to the advancement of science.

"To serve as a means of bringing American and foreign investigators into active cooperation with the scientific and technical services of the War and Navy Departments and with those of the civil branches of the Government.

"To direct the attention of scientific and technical investigators to the present importance of military and industrial problems in connection with the war, and to aid in the solution of these problems by organizing specific researches.

"To gather and collate scientific and technical information at home and abroad, in cooperation with governmental and other agencies, and to render such information available to duly accredited persons."

Effective prosecution of the Council's work requires not only the cordial collaboration of scientific and technical men of the universities and special research institutions all over the country, but also those connected with the scientific and technical branches of the Government.
As now organized, the National Research Council has permanent headquarters in Washington, with an executive staff of scientific men giving their whole time to the work of their respective positions. The Council's field of activities is divided among thirteen divisions, gathered into two main groups; first, one of six "general relations" divisions, and second, one of seven divisions devoted to special lines of science and technology. Each of these divisions has a resident chairman and a small office staff in Washington and a number of non-resident members.

In the first, or "general relations" group of divisions, there is a Government Division, under the chairmanship of Dr. Charles D. Walcott, secretary of the Smithsonian Institution; a Division of Foreign Relations with Dr. George E. Hale, director of the Mt. Wilson Solar Observatory, as chairman, and a membership including various well-known scientific men, and Mr. Elihu Root, former Secretary of State, and Mr. William Phillips, present Assistant Secretary of State; a Division of States Relations, to maintain close contact with all State bureaus of science; a Division of Educational Relations, with a membership including officially appointed representatives of all the principal university associations, and the United States Bureau of Education, together with a number of other members, among whom are Abraham Flexner, secretary of the General Education Board, H. S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching, and Herbert Hoover; a Division of Industrial Relations, with a membership representing the Government Bureau of Mines and Chemistry, the Naval Consulting Board, and a number of large American industrial and engineering concerns; and, finally, a Division of Research Information, with a long list of members representing such Government bodies as the Department of State, the Military Intelligence Service, the Public Health Service, the Department of Justice, the Post Office Department, the Department of the Interior, and other organizations such as the Wistar Institute of Anatomy and Biology, the School of Hygiene of Johns Hopkins University, and the Harvard Graduate School of Business Administration. This division has the largest permanent staff of any of the General Relations Divisions and will be a veritable national center of information concerning American research work and research workers, with all of its information promptly available to institutions and individuals interested in knowing at any time what problems are under investigation in America and their status.

In the group of divisions relating to special lines of science and technology there is a Division of Physical Science with members representing the American Astronomical Society, American Physical Society, and American Mathematical Society, together with others.

This division has attached to it over a score of special committees for the consideration of problems in as many different special phases of the physical sciences. There is a Division of Engineering with members representing the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Civil Engineers, the American Society for Testing Materials, the Illuminating Engineering Society, the Western Society of Engineers, the Society of Automotive Engineers, the U. S. Bureau of Standards, and U. S. Bureau of Mines, together with a dozen other members representing large engineering firms. There are nineteen special committees attached to this division for the consideration of such special problems as electric insulation, standardizing of bearing metals, uses of alloy steels, improvements of metals at blue heat, etc. This division is in close association with the Engineering Foundation.

There is a Division of Chemistry and Chemical Technology, with members including representatives of the American Chemical Society, the American Electro-Chemical Society, the American Institute of Chemical Engineers, and the American Ceramic Society, together with a number of others chosen from among the leading chemists of the country. It has attached to it six special committees giving particular attention to investigations of explosives, synthetic drugs, colloids, sewage disposal, etc.

There is a Division of Geology and Geography, with members representing the Association of American Geographers, the American Geographical Society, the Geological Society of America, the Palaeontological Society, the National Geographic Society, and the U. S. Geological Survey, together with other members chosen from among the investigating geologists of the country. It has attached to it ten special committees giving particular attention to such subjects as seismology, sedimentation, Pacific exploration, economic survey of the sea, etc.

There is a Division of Medical Sciences with Dr. Henry A. Christian, of the Harvard Medical School, as chairman, and Dr. R. G. Hussey, of the Rockefeller Institute for Medical Research, as vice-chairman, and members representing the American Association of Anatomists, the American Association of Pathologists and Bacteriologists, the American Neurological Society, the American Psychological Society, the American Roentgen Ray Society, the American Society for Clinical Investigation, the American Society for Experimental Pathology, the American Society for Pharmacology and Experimental Therapeutics, the American Society of Biological Chemists, the American Surgical Association, the Association of American Physicians, and the National Dental Association, together with other members.

There is a Division of Biology and Agriculture with members representing the American Society of Agronomy, the American Society of Bacteriologists, the Botanical Society of America, the Ecological Society of America, the American Society of Economic Entomologists, the Society of American Foresters, the American Genetics Association, the American Society for Horticultural Science, the American Phytopathological Society, and the Society of American Zoologists, together with other leading American zoological and botanical investigators. There are attached to this division fifteen special committees which deal with such subjects as food and nutrition, forestry, oceanography, biology of tropical America, fertilizers, etc.
Finally, there is a Division of Anthropology and Psychology, as yet without a chairman, but with a list of members chosen from among the leading psychologists and anthropologists of the country.

The success of the attempt of the National Research Council at thorough organization of American science will play a great part in a further development of American resources, an increase of American productivity, and an advance in American well-being. The war produced a swift national and even international organized scientific effort, and the effort produced results. It would be humiliating to confess that we can do such things only under the stimulus of war. But we shall not have to confess this. We will do as well—we ought to do even better—in peace time.
Preliminary Report of Committee R on the Promotion of Research in Colleges and Universities

[Presented at the Annual Meeting, Baltimore, December 28, 1918.]

The Committee on Research, whose questionnaire was published in the May Bulletin, 1918, p. 7, offers the following tentative report:

It is abundantly clear that research in the natural sciences that have an immediate practical bearing has been stimulated by the war. Now that the war is over and the period of reconstruction has begun, this will doubtless have an effect on our universities, whose administrations do not need to be reminded that a physicist or a chemist or a botanist can accomplish little of permanent value unless the opportunities for original work are not only maintained but enlarged. The public itself has been made aware as never before that investigations in physics, in chemistry, in agriculture, in medicine are indispensable to human welfare; and it is improbable that any of these subjects will lack either funds or facilities for research work.

To a considerable extent, this is true also of such branches of study as economics, sociology and history. The money and the labor questions, the problems involved in the reorganization of society, the ethology and history of European nations, the "causes of the war," and so on are too important to permit of indifference or neglect on the part of our universities.

On the other hand, the humanistic subjects, which include of course those aspects of history, law, etc., that do not bear directly on the problems of reconstruction, run a far greater danger. Where the subject has a utilitarian, practical aspect—for example, modern languages—the tendency will probably be to "investigate" that phase of it which can be made pedagogically available. In this respect, the attention now given to research in phonetics in many places is doubtless symptomatic. The British Parliamentary Report of the Committee on Modern Languages shows the direction in which the pendulum will probably swing. Nevertheless, who will be so bold as to affirm that one subject possesses a practical value and another not, however utilitarian the former may seem? We can no more afford to neglect the past than we can the present, if our information is to be sound. The value of knowledge will naturally vary in kind and degree, although when and to what extent it will be practically useful, no one can possibly predict. Our Secretary of State has recently said:
In a conflict so universal as to involve the whole earth, new impulses of human action have been set in motion, not only in the political, industrial and commercial spheres, but in the structure of society and the spiritual life of mankind. . . . With all this we must reckon.

Obviously the "spiritual life of mankind," if it means anything, signifies everything that has contributed to make it what it is, and here Greek and Latin, Sanskrit and Hebrew, ancient as well as mediæval and modern history, Egyptology, Russian, etc., are concerned.

The Committee wishes, therefore, to reaffirm the fact that research in all branches of knowledge is indispensable, particularly so now when it behooves mankind to view its problems more than ever sub specie aeterndatis. The Committee believes that the liberating quality of research is "an intuition or an axiom"—to modify slightly the statement of one of its members. And to this no subject of graduate study can properly be considered an exception. In no way whatsoever should the purely professional or pedagogic aims of our colleges and universities be allowed to discourage or curtail research work.

But the Committee is agreed that the boundaries of graduate work need closer definition. Not in all respects, nor in all universities, is the work of the investigator properly guarded against the encroachments of the utilitarian or professional interest. In many subjects this condition is perhaps inevitable, since the student is primarily bent on preparing himself for the exercise of a profession in which research can have but a comparatively slight part. A strong argument can be made that most professional training is not only benefited by but also contingent upon some practice in original investigation; certainly in courses of study leading to the Doctor's Degree, training in research is a sine qua non. It is clear, however, that graduate work of the highest type depends for its success ultimately on the individual professor and the student co-operating productively. The real graduate school has as its object investigation. Whether the research is done in "a course" or "a seminar" or by means of private consultation between the professor and the student, is here beside the question. In any case two essential conditions are necessary: (1) only those qualified by ability and interest should undertake investigation, and (2) the universities should recognize fully the claims of productive scholarship to opportunities and freedom of work. Both conditions, clearly, apply to student and professor alike.

The first of these conditions is a question of principle, whereas both are questions of administration. We all know how difficult it is to carry on an investigation with ill-qualified students or with groups of students, some of whom are either not qualified or not interested. In order to be effective, research must be conducted as an aim-in-itself, and quality not quantity is the important factor. Most of our universities will readily admit this to be true; some may regard it even as axiomatic. The chairman is acquainted with a department (in a scientific subject) in which the last year of the graduate work consists exclusively of research, under the personal supervision of the professor with whom the student is working and under excellent material conditions. But is this not the exception rather than the rule? And how often does happen that the administration questions the value of a course, not to say of the professor, merely because the number of students is small and the subject-matter seems abstruse. Doubtless some subjects are better off in this respect than others. The natural sciences, as indicated, seem to fare best. And yet a member of the Committee representing the sciences complains of "the ceaseless grind of treadmill laboratory work," which "the student has to toil through before research is open to him. This would be all right if it were really disciplinary, but it is not; it is for the most part purely mechanical—our universities ought in some way to provide for the exceptional person in such fashion as not completely to kill all originality and initiative." Statistics on such matters are very hard to get; at least such statistics as will reveal the true conditions. But it is hardly an exaggeration to say that in many subjects, notably the humanities, the universities still treat the graduate student (even in his second or third year's work) essentially as an advanced "undergraduate" by planning for him courses that are purely informational and not deliberately productive in their nature. It would be folly to attempt to lay down any hard and fast rule on such matters, or to generalize from one or two cases. But it should be useful to point out the fact and to suggest a corrective. And the corrective is the fuller recognition than is the case at present of the selective principle for graduate work. Our university administrations should by every means possible, official and other, encourage the professor to work with select bodies of students. In more branches than at present the professor in charge of graduate work should be made to feel that this is his first and main duty or function.

As for the second of the above conditions, it will evidently be difficult or indeed impossible to put the selective principle into operation unless our universities draw a sharper line between undergraduate and graduate students as such. In fact, it might be well to distinguish three classes: (1) undergraduates; (2) professional students; (3) graduate students. However that may be—and it is again impossible to legislate ex nihilo as to how much research work, if any, the professional student should have, inasmuch as most if not all of our graduate students are preparing for a profession—it yet seems manifest that a rigid division between undergraduates and graduates is not only desirable but necessary. The Johns Hopkins University as originally planned did this very thing. What militates against its realization at present in the opinion of the Committee, is, in large part at least, our present "course" or "credit" system.
To quote a passage from a letter of one of the Committee, himself an administrator, the situation may be summed up in these somewhat drastic terms:

The general tendency of the exaggeration of administration in American educational institutions is to treat a university like a factory. If we have got to choose, I should be more inclined to say it should be treated like a monastery. At any rate, I am sure that so far as our graduate work is concerned, we must be delivered from the mechanism of courses, office hours, and all that sort of thing, which belong to manufacturing institutions and not to institutions of learning.

Or as another member, also an administrator says:

Residence at a university should be defined in terms of attendance upon courses, but should imply no more than attendance and payment of fees. All course credits should be abolished, so that there will be no possibility of a student receiving a degree by the accumulation of such credits. The scholarship requirement for the degree should be defined independently of the residence requirement. They should be defined in terms of the subject-matter.

Granted—but how can a reform here be brought about? Most of our administrators will say that the “course-credit” system serves the useful purpose of estimating the degree of preparation and the type of information the student possesses or should possess, and that it is difficult to estimate this in any other way. Besides, it will be said that the individual professor is always free to make his own evaluation of the student’s ability—independently of “course-credit” and to communicate this information to others.

In reply to these objections, the Committee would point out that, admitting the correctness of the above contentions, it is nevertheless true that in the mind of the student the present “course” or “credit” system has taken on an importance quite out of proportion to its real value—at least for graduate work. It is in order to correct this attitude on the part of all concerned but especially that students, that the committee makes the following suggestion:

In each department of our universities there are two or three or more professors who direct research. Let these professors, singly or as a body, testify as to the student’s equipment, not on the basis of courses but with reference to the candidate’s intellectual promise as an investigator. The method by which this information is procured will necessarily vary: it may be obtained through formal examination, or by conferences with all the registered graduate students, or by some other means. The important thing is that a department, after a certain lapse of time—say a year as the minimum—should be prepared to say to the corresponding department in another university: so-and-so is or is not in our opinion fitted to do research work. The committee admits that in many cases this procedure, or what amounts to it, is already in practice. But the point is, and on this the Committee is a unit, it is not the officially recognized procedure, and that it ought to be. In this way, and only in this way, will it become the rule to consider graduate work in terms of mental attainment and promise and not as a mere matter of courses passed or failed.

Believing that this reform is capable of realization, the Committee thinks further that the research student, once accepted as such, should be granted greater freedom to choose his courses than other students. If this is the general practice in some universities, it is not the case or only in part the case in others. As to the library in particular, where the research student should have ready access to the shelves; that he should have a study- or work-table next to the books, and that, as one member of the Committee suggests, the university librarians should seek to establish—perhaps through the Carnegie Institution—“some central bureau of information through which one might easily find out if and where in the United States a given book is to be found.” Our present library exchange, helpful as it is, does not and cannot provide this feature, which in itself would greatly facilitate our research work. Material is available to show that in general our university libraries could serve the special university needs. A university library is a public institution in a restricted sense only. It fulfills its purpose best when it provides the means for specialist work. It should, therefore, contribute in every manner possible to further investigation in those subjects for which the university stands. And this is possible only if our library staffs possess a real knowledge of books, of bibliographical aids, of the resources of the library itself, and a disposition to place them at the service of the investigator under the most favorable conditions, over and above the attention and the energy now devoted to cataloging and preserving the acquisitions that the library makes. A university library, it may be said, is a “workshop” and not primarily a system of catalogs or a repository of printed material.

As to the question of publication, here again Committee V will doubtless have useful things to say. On our part we would suggest that the channels of publication could be greatly improved in two directions:

1. By strengthening the support of existing journals of recognized merit. This could be done by direct subsidy in certain fields, either from several universities as a group or from several learned bodies working in cooperation; and

2. By the franker recognition on the part of the Carnegie Institution of research in the field of the humanities. Much would be gained if this body would publish a series of treatises or articles too long for our journals to publish and too unremunerative for the general trade. Or, if the Carnegie Institution is unavailable, then the separate university presses might combine in order to subsidize and publish such series. Moreover, the “miscellaneous” type of
publication now maintained by some of our universities might thus be discontinued and the funds set free thereby devoted to this central agency, which would operate under proper editorial supervision.

In conclusion, the Committee makes the following recommendations:

1. That the universities be asked to recognize their research students—that is, their graduate students whose capacity for research has been tested and approved—as a distinctive group, to be designated as such. This need not imply that other students should be excluded from research courses. On the contrary, such courses must be readily accessible for the purpose of testing the student’s ability. At the same time, there should be a clear-cut division between those students whose capacity is admitted and those whose capacity is still untried.

2. That for such students a statement of knowledge and ability—like the French certificat d’aptitude—be issued through the graduate dean by the department in which the student is doing research work, this statement to be given preference over the present system of “course-credits,” which for purely administrative reasons can hardly be abolished but to which less importance should be attached.

3. That in universities in which it is not yet the case, such students be accorded practically the same library and laboratory facilities as the professors with whom they are working—including in each case a study-table in the library. That, further, the university libraries be urged to give greater attention to the special needs of research students, in such a way that the libraries shall be administered in behalf of investigators rather than of the general reader.

4. That the media of publication be strengthened in the directions indicated above.

The Committee has purposely approached the question of research from the point of view of the student and the facilities offered him for work. There remains the fundamental question of research in relation to the professor, which the Committee feels is equally important. But as this involves the problem of a better classification of professors into various groups, the research and the teaching types, and the further distinction between genuine universities and those that are mainly or entirely professional schools, involving also the important matter of promotions and salaries, it was deemed advisable to leave the question of research as regards the professor for a later more detailed report. For the present at least, it will be admitted that if the facilities for research are improved along the lines treated in the report the position of the professor engaged in research will necessarily be bettered. And from this it will be but a step to proceed to a fuller recognition of the just claims of the research professor, both in respect to opportunity for work and to adequate recognition by way of promotion and salary.

So, too, an improved method of assigning “fellowships” could be worked out in connection with the above plan, but with this the Committee did not feel called upon to deal at present.*

The Committee:

E. C. Armstrong, Princeton University
Carl Becker, Cornell University
Maurice Bloomfield, Johns Hopkins University
A. C. L. Brown, Northwestern University
A. R. Hohlfeld, University of Wisconsin
E. P. Lewis, University of California
J. L. Lowes, Harvard University
F. C. Newcombe, University of Michigan
W. A. Oldfather, University of Illinois
Roscoe Pound, Harvard University
C. C. Torrey, Yale University
F. J. E. Woodbridge, Columbia University
Wm. A. Nettle, University of Chicago, Chairman.

* The discussion of the report at the Baltimore meeting by Professor Lovejoy brought out a point which it seems wise to comment on here. Mr. Lovejoy said: “If we are to maintain anything that genuinely deserves the name of graduate work we must set ourselves rigorously against a tendency to which many institutions are tempted—that of having sham graduate schools. We ought to make it clear to executive boards of all institutions that profess to carry on graduate work for more than a year or two, that such work, honestly done, means having a special faculty devoted exclusively, or almost exclusively, to graduate instruction and research; and we should emphatically urge that this kind of work should be attempted only by universities having funds and equipment sufficient to enable them to carry it on in this manner.” This idea is voiced also by at least two members of the Committee. Professor Oldfather says: “An effort might well be made to define a ‘standard’ graduate school, as a standard college and a standard high school have recently been defined. This should tend to concentrate graduate instruction at the points where it can be conducted effectively, and should discourage institutions with inadequate resources from professing to give graduate instruction.” And Professor Hohlfeld writes: “I should like to see a suggestion that we have far too many institutions attempting to make Ph.D.’s. If we had twenty or even twenty-five real universities carrying their students to a Ph.D. degree whereas the others were satisfied to have strong M.A. courses, we should be infinitely better off. And until we have a clearer classification of institutions and professors, all attempts to emphasize research may do more harm than good. The very men and institutions that ought to do strong, effective teaching (by no means only ‘informational’ in character) will, I fear, be the first to try to prove their belonging to the select by going off on the research tangent.” The idea involved in these suggestions if carried out would require: (1) a survey of existing universities with reference to research facilities; (2) a classification of each university as fit or unfit to give graduate instruction, in all departments or in some departments; (3) the acceptance by the universities of the results of the survey and the fuller recognition by them of “graduate schools,” as distinct in aims and methods from their “colleges” and “professional schools.”
THE NATIONAL RESEARCH COUNCIL
ORGANIZATION AND MEMBERS
1919—1920

WASHINGTON, D. C.
DECEMBER, 1919
THE NATIONAL RESEARCH COUNCIL

Established in 1916 under the Congressional Charter of the National Academy of Sciences and organized with the cooperation of the National Scientific and Technical Societies of the United States.

Home Office: Washington, D. C., 1201 Sixteenth Street N. W.
Telephone: Main 2615

*Branch Office: New York City, 29 West Thirty-Ninth St.
Telephone: Vanderbilt 4600

STATUS, AFFILIATIONS AND SUPPORT OF THE NATIONAL RESEARCH COUNCIL

The National Research Council is an organization established by the National Academy of Sciences under its national charter and constitution.

The Engineering Foundation of New York co-operates with the Council in the support of the Division of Engineering.

During the war the National Research Council acted, in a cooperative capacity, as the Department of Science and Research of the Council of National Defense; also, as the Science and Research Division of the U. S. Signal Corps. In this connection, during the war, it received a considerable part of its support from the Government, but since its re-organization after the war it derives its support wholly from private sources.

ORIGIN OF THE NATIONAL RESEARCH COUNCIL

The Congressional charter of the National Academy of Sciences provides that “the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art.” Under this provision the Academy has acted since the time of its establishment as an official adviser of the Government on a wide variety of questions. At the time of its foundation during the Civil War, as the earlier records of the Academy indicate,

* Division of Engineering of the National Research Council.
its committees and its members dealt actively with military and naval problems of precisely the same type as those which have insistently pressed for solution during the recent war. It was thus a natural step on the part of the Academy to offer its services to the President at a time, in April, 1916, when our relations with Germany were already tense, and for the President to accept the offer, and to request the Academy to organize the scientific and technical resources of the country in the broadest and most effective manner, to accomplish the objects in view.

This request from the President was accepted by the Academy and, fortified by its charter, it took steps which soon led to the establishment of the National Research Council, without seeking additional authority. However, as the work of the Research Council progressed, it became evident that a definite formulation of its objects by the President, and an expression of his desire that it be perpetuated by the Academy and permanently assured of the co-operation of the various departments of the Government, would serve a useful purpose. The President's recognition of this fact led him to issue an Executive Order on May 11, 1918, which serves to supplement the charter of the Academy and constitutes a request for the permanent exercise of such functions as the National Research Council has been able to render.

In compliance with this Executive Order the National Research Council has been reorganized, and constituted upon a permanent basis as a body subordinate to the National Academy of Sciences, which itself rests upon its Congressional charter but is not in the usual sense a governmental institution.

PURPOSES AND DUTIES OF THE NATIONAL RESEARCH COUNCIL

The purposes and duties of the National Research Council are defined by the Executive Order of the President as follows:

EXECUTIVE ORDER ISSUED BY THE PRESIDENT OF THE UNITED STATES MAY 11, 1918

The National Research Council was organized in 1916 at the request of the President by the National Academy of Sciences, under its Congressional charter, as a measure of national preparedness. The work accomplished by the Council in organizing research and in securing co-operation of military and civilian agencies in the solution of military problems demonstrates its capacity for larger service. The National Academy of Sciences is therefore requested to perpetuate the National Research Council, the duties of which shall be as follows:

1. In general, to stimulate research in the mathematical, physical and biological sciences, and in the application of these sciences to engineering, agric-

5
culture, medicine and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare.

2. To survey the larger possibilities of science, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects.

3. To promote cooperation in research, at home and abroad, in order to secure concentration of effort, minimize duplication, and stimulate progress; but in all cooperative undertakings to give encouragement to individual initiative, as fundamentally important to the advancement of science.

4. To serve as a means of bringing American and foreign investigators into active cooperation with the scientific and technical services of the War and Navy Departments and with those of the civil branches of the Government.

5. To direct the attention of scientific and technical investigators to the present importance of military and industrial problems in connection with the war, and to aid in the solution of these problems by organizing specific researches.

6. To gather and collate scientific and technical information at home and abroad, in cooperation with Governmental and other agencies and to render such information available to duly accredited persons.

Effective prosecution of the Council's work requires the cordial collaboration of the scientific and technical branches of the Government, both military and civil. To this end representatives of the Government, upon the nomination of the National Academy of Sciences, will be designated by the President as members of the Council, as hereinafter, and the heads of the departments immediately concerned will continue to cooperate in every way that may be required.


Therefore, as now constituted, the chief purpose of the Council is to organize scientific effort—to survey and collate, and to initiate, promote, and stimulate research in science and its useful applications.

ORGANIZATION OF THE NATIONAL RESEARCH COUNCIL

Under the permanent organization adopted, the work of administration is carried on by a small group of officers and an Executive Board, with a smaller Interim Committee which acts for the Board in the intervals between its stated meetings.

The technical work of the Council is distributed among its Divisions, thirteen in number, six of which deal with the more general aspects and contacts of research, and seven with restricted fields in science.

The membership of the Council in its Divisions consists of representatives officially designated by the leading scientific and technical societies of national scope, representatives of the Government, representatives of other particular research organizations, and members at large chosen by the Divisions.

The organization and personnel* of the National Research Council for 1919–20 follows:

* Some of the Divisions are not yet completely reorganized.
DIVISIONS

DIVISIONS OF GENERAL RELATIONS

I. Government Division.
II. Division of Foreign Relations.
III. Division of State's Relations.
IV. Division of Educational Relations.
V. Division of Research Extension.
VI. Research Information Service.

DIVISIONS OF SCIENCE AND TECHNOLOGY

VII. Division of Physical Sciences.
VIII. Division of Engineering.
IX. Division of Chemistry and Chemical Technology.
X. Division of Geology and Geography.
XI. Division of Medical Sciences.
XII. Division of Biology and Agriculture.
XIII. Division of Anthropology and Psychology.

OFFICERS

Honorary Chairman, GEORGE H. HALLE, Director, Mount Wilson Observatory, Carnegie Institution of Washington, Pasadena, California.
Chairman, JAMES R. ANGELL, Dean of the Faculty of Science, and Head of the Department of Psychology, University of Chicago, Chicago, Illinois.
First Vice-Chairman, CHARLES D. WALCOTT, Secretary of the Smithsonian Institution, President of the National Academy of Sciences, Washington, D.C.
Second Vice-Chairman, GEORGE DUNN, President, The J. C. White Engineering Corporation, 45 Exchange Place, New York City.
Third Vice-Chairman, R. A. MILLIKAN, Professor of Physics, University of Chicago, Chicago, Illinois.
Secretary, VERNON KELLOGG, Professor of Entomology and Lecturer in Zoology, Leland Stanford Junior University, Stanford University, California.
And by reciprocal arrangement with the Engineering Foundation—
Assistant Secretary, ALFRED D. FINE, Secretary of the Engineering Foundation, 29 West Thirty-ninth Street, New York City.

EXECUTIVE BOARD

Chairman, JAMES R. ANGELL.

Members Ex-officio

Officers of the Council.
President of the National Academy of Sciences.
CHARLES D. WALCOTT, Secretary of the Smithsonian Institution, Washington, D.C.
Home Secretary of the National Academy of Sciences.
C. G. ARBET, Director, Astrophysical Observatory, Smithsonian Institution, Washington, D.C.
President of the American Association for the Advancement of Science.
SIMON FLEXNER, Director of Laboratories, Rockefeller Institute for Medical Research, Sixty-sixth Street and Avenue A, New York City.
Chairmen and Vice-Chairmen of the Divisions of Science and Technology.
Chairman of the Divisions of General Relations.

Members at Large

E. D. ADAMS, Fellow, American Society of Civil Engineers, Member, American Institute of Electrical Engineers, 71 Broadway, New York City.
J. C. CARY, Vice-President, American Telephone and Telegraph Company, 155 Broadway, New York City.
GEORGE DUNN, President, The J. C. White Engineering Corporation, 45 Exchange Place, New York City.
R. A. MILLIKAN, Professor of Physics, University of Chicago, Chicago, Illinois.
A. A. NOYES, Professor of Theoretical Chemistry and Director, Research Laboratory of Physical Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts.
RAYMOND PEARL, Professor of Biometry and Vital Statistics, The Johns Hopkins University, Baltimore, Maryland.
M. L. PEPIN, Professor of Electro-Mechanics, Columbia University, New York City.
S. W. STRATTON, Director, U.S. Bureau of Standards, Washington, D.C.
W. H. WELCH, Director, School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland.

Stated meetings of the Executive Board of the National Research Council are held on the second Tuesday of each month.
I. GOVERNMENT DIVISION*

Chairman, Charles D. Walcott, Secretary of the Smithsonian Institution; President, National Academy of Sciences, Washington, D. C.
Secretary ex-officio, R. M. Yerkes, Chairman of the Research Information Service, National Research Council.

II. DIVISION OF FOREIGN RELATIONS†

Chairman, George E. Hale.

Executive Committee
Chairman, George E. Hale; James R. Angell, John C. Merriam, R. M. Yerkes, H. A. Bumpstead.

MEMBERS OF THE DIVISION
Representatives of
DEPARTMENT OF STATE
Hon. William Phillips, Assistant Secretary of State, Washington, D. C.

NATIONAL ACADEMY OF SCIENCES
George E. Hale, Foreign Secretary, National Academy of Sciences; Director, Mount Wilson Observatory, Carnegie Institution of Washington, Pasadena, California.

NATIONAL RESEARCH COUNCIL
James R. Angell, Chairman, National Research Council; Dean of the Faculties of Arts, Literature, and Science, and Head of the Department of Psychology, University of Chicago, Chicago, Illinois.

John C. Merriam, Former Chairman, National Research Council; Professor of Paleontology and Historical Geology, University of California, Berkeley, California.

R. M. Yerkes, Chairman, Research Information Service, National Research Council.

AMERICAN PHILOSOPHICAL SOCIETY
Henry Fairfield Osborn, President of the Trustees, American Museum of Natural History, New York City.

AMERICAN ACADEMY OF ARTS AND SCIENCES
Arthur A. Noyes, Professor of Theoretical Chemistry and Director Research Laboratory of Physical Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Members at Large
Hon. Elihu Root, Former Secretary of State, New York City.
H. A. Bumpstead, Former Scientific Attaché at London; Professor of Physics and Director of the Sloan Physical Laboratory, Yale University, New Haven, Connecticut.

III. DIVISION OF STATES RELATIONS†

Chairman, John C. Merriam.

Executive Secretary, Albert L. Barrows.

* This Division is not yet organized, but will be composed of representatives of each of the scientific bureaus of the Federal Government.
† This Division is not yet completely organized.

GOVERNMENT DIVISION

The President of the United States, on the recommendation of the President of the National Academy of Sciences, acting as Chairman of the Government Division of the National Research Council, has designated the following representatives of various Departments to act as members of this Division.

DEPARTMENT OF STATE
Julius G. Lay, Acting Foreign Trade Adviser.

DEPARTMENT OF THE TREASURY
Assistant Surgeon-General J. W. Scherbeschewsky, P. H. S.

DEPARTMENT OF WAR
Major William M. Fassett, General Staff, U. S. A.
Brigadier-General Marshall C. Czech, Military Intelligence Division, U. S. A.
Colonel Frederick F. Ruhfeld, Medical Corps, U. S. A.
Colonel Clarence O. Sier, Corps of Engineers, U. S. A.
Colonel Colden L. T. Ruggles, Ordnance Department, U. S. A.
Major-General George S. Squires, Signal Corps, U. S. A.
Lieutenant-Colonel Robert E. Callan, Coast Artillery, U. S. A.
Lieutenant-Colonel Byron Q. Jones, Air Service, U. S. A.
Major-General William L. Sherritt, Chemical Warfare Service, U. S. A.

DEPARTMENT OF JUSTICE
John T. Creighton, Bureau of Investigation.

DEPARTMENT OF THE NAVY
Rear-Admiral Albert P. Niblack, Office of Naval Intelligence of the Office of Naval Operations, U. S. N.
Rear-Admiral R. S. Griffin, U. S. N., Bureau of Steam Engineering.

DEPARTMENT OF THE INTERIOR
M. H. Coulston, Assistant Commissioner of Patents.
S. P. Capen, Bureau of Education.
George Otis Smith, Director, U. S. Geological Survey.
A. P. Davis, Director and Chief Engineer, U. S. Reclamation Service.
F. G. Cottrell, Assistant Director, Bureau of Mines.

DEPARTMENT OF AGRICULTURE
C. F. Marvin, Chief of Weather Bureau.
J. R. Mohler, Bureau of Animal Industry.
K. F. Kellerman, Bureau of Plant Industry.
H. S. Grayes, Forest Service.
C. L. Alsebro, Bureau of Chemistry.
Milton Whitney, Bureau of Soils.
L. O. Howard, Bureau of Entomology.
E. W. Nelson, Bureau of Biological Survey.
T. H. MacDonald, Bureau of Public Roads.
DEPARTMENT OF COMMERCE

Joseph A. Hill, Bureau of Census.
S. W. Stratton, Director, Bureau of Standards.
Hugh M. Smith, Commissioner of Fisheries.
William Bowie, Hydrographic and Geodetic Engineer, Coast and Geodetic Survey.

DEPARTMENT OF LABOR

Royal Meeker, Commissioner of Labor Statistics.

III. DIVISION OF STATES RELATIONS

Representatives of

DIVISION OF MEDICAL SCIENCES
V. C. Vaughan, Professor of Hygiene and Physiological Chemistry and Dean of the Medical School, University of Michigan, Ann Arbor, Michigan.

DIVISION OF BIOLOGY AND AGRICULTURE
A. F. Woess, President, Maryland State College of Agriculture, College Park, Maryland.

DIVISION OF ANTHROPOLOGY AND PSYCHOLOGY

Members at Large
E. A. Birge, President, University of Wisconsin, Madison, Wisconsin.
John M. Clarke, State Geologist and Palaeontologist, Director, State Museum, Education Building, Albany, New York.
James A. B. Scheer, President, Throop College of Technology, Pasadena, California.

† Recent appointments.

IV. DIVISION OF EDUCATIONAL RELATIONS

Chairman, Vernon Kellogg.
Secretary, Albert L. Barrows.

MEMBERS OF THE DIVISION.

Vernon Kellogg, Professor of Entomology and Lecturer in Biomics, Leland Stanford Junior University, Stanford University, California.

Representatives of Societies

ASSOCIATION OF AMERICAN COLLEGES
Donald J. Cowlino, President, Carleton College, Northfield, Minnesota.

ASSOCIATION OF AMERICAN UNIVERSITIES
A. Ross Hill, President, University of Missouri, Columbia, Missouri.
AMERICAN ASSOCIATION OF UNIVERSITY PROFESSORS

E. Percival Lewis, Professor of Physics, University of California, Berkeley, California.

NATIONAL ASSOCIATION OF STATE UNIVERSITIES

Frank L. McVey, President, University of Kentucky, Lexington, Kentucky.

UNITED STATES BUREAU OF EDUCATION


RESEARCH FELLOWSHIP BOARD OF THE NATIONAL RESEARCH COUNCIL

Simon Flexner, Director of Laboratories, Rockefeller Institute for Medical Research, 66th Street and Avenue A, New York City.

Members at Large

Abraham Flexner, Secretary, General Education Board, New York City.

H. E. Gregory, Silliman Professor of Geology, Yale University; Superintendent, Geological and Natural History Survey of Connecticut, New Haven, Connecticut.

Herbert Hoover, Ex-United States Food Administrator; Trustee of Leland Stanford Junior University, Stanford University, California.

A. O. Leuschner, Professor of Astronomy and Director of the Students’ Observatory, University of California, Berkeley, California.

J. C. Merriam, Professor of Paleontology and Historical Geology, University of California, Berkeley, California.

H. S. Parmelee, President, Carnegie Foundation for the Advancement of Teaching, New York City.

Colonel Robert I. Rix, General Staff, and Chief Education and Recreation Branch of the War Plans Division, War Department, Washington, D. C.

R. M. Yerkes, Chairman, Research Information Service, National Research Council, Washington, D. C.

V. DIVISION OF RESEARCH EXTENSION

Chairman, John Johnston.

Vice-Chairman, Harrison E. Howe.

Executive Committee

Chairman, John Johnston; Vice-Chairman, Harrison E. Howe; C. E. K. Mees, G. K. Burgess, A. D. Flinn.

MEMBERS OF THE DIVISION.

Ex-Officio

Charles E. Mendenhall, Chairman, Division of Physical Sciences, National Research Council; Professor of Physics, University of Wisconsin, Madison, Wisconsin.

Comstock, Adams, Chairman, Division of Engineering, National Research Council; Past President, American Institute of Electrical Engineers; Lawrence Professor of Engineering, Harvard University, Cambridge, Massachusetts.

W. D. Bancroft, Chairman, Division of Chemistry and Chemical Technology, National Research Council; Professor of Physical Chemistry, Cornell University, Ithaca, N. Y.

Representations of Government Bureaus

BUREAU OF MINES


BUREAU OF CHEMISTRY

F. P. Vinten, Chemist in Charge of the Leather and Paper Laboratory, U. S. Bureau of Chemistry, Department of Agriculture, Washington, D. C.

BUREAU OF STANDARDS


Members at Large

L. H. Baekeland, Member, Naval Consulting Board, Yonkers, N. Y.

John J. Carty, Vice-President, American Telephone and Telegraph Company, 135 Broadway, New York City.


Alfred D. Flinn, Secretary of the Engineering Foundation, 29 West 59th Street, New York City.

Harison E. Howe, Executive Officer of the Division, Washington, D. C.

John Johnston, Professor of Chemistry, Yale University, New Haven, Connecticut.

C. E. K. Mees, Director of Development and Research, Eastman Kodak Company, Rochester, N. Y.

Walter Rautenstrauch, Professor of Mechanical Engineering, Columbia University, New York City.

C. P. Townsend, Parent Attorney, Washington, D. C.

E. W. Washburn, Head of the Department of Ceramic Engineering, and Professor of Ceramic Chemistry, University of Illinois, Urbana, Illinois.

W. R. Whitney, Director of Research Laboratory, General Electric Company, Schenectady, N. Y.

VI. RESEARCH INFORMATION SERVICE

Chairman, R. M. Yerkes.

Vice-Chairman, Rear-Admiral Albert P. Niblack.

Executive Committee

Chairman, R. M. Yerkes; Vice-Chairman, Rear-Admiral Albert P. Niblack; Wesley C. Frost, Charles E. Mendenhall, Edwin F. Gay.

MEMBERS OF THE DIVISION.

Ex-Officio

James R. Angell, Chairman, National Research Council; Dean of the Faculty of Arts, Literature, and Science, and Head of the Department of Psychology, University of Chicago, Chicago, Illinois.

C. D. Walcott, Chairman, Government Division; Secretary Smithsonian Institution; President, National Academy of Sciences, Washington, D. C.

George E. Hale, Chairman, Division of Foreign Relations; Director, Mount Wilson Observatory, Carnegie Institution of Washington, Pasadena, California.
Department of the Interior


Department of Agriculture

Carl L. Alberg, Chief, Bureau of Chemistry, Washington, D. C.

Department of Commerce

S. W. Stratton, Director, U. S. Bureau of Standards, Washington, D. C.

Department of Labor


Members at Large


Fuller R. Callaway, Cotton Financier and Manufacturer, LaGrange, Georgia.

W. R. DeField, Management Engineer, 208 LaSalle Street, Chicago, Illinois.

Edwin F. Gay, Managing Editor, New York Evening Post, New York City.

Milton J. Greenman, Director, Wistar Institute of Anatomy and Biology, Philadelphia, Pennsylvania.


Arthur D. Little, President, Arthur D. Little, Inc., Industrial Research Laboratories, 30 Charles River Road, Cambridge, Massachusetts.

Raymond Pearl, Professor of Biometry and Vital Statistics, The Johns Hopkins University, Baltimore, Maryland.


Milton C. Whitaker, Consulting Chemical Engineer, New York City.

VII. Division of Physical Sciences

Chairman, C. E. Mendenhall
Fiske Chairman, Augustus Trowbridge

Executive Committee

Chairman, C. E. Mendenhall; Fiske Chairman, Augustus Trowbridge; W. W. Campbell, Director, Lick Observatory, Mt. Hamilton, California.

H. N. Russell, Professor of Astronomy, Princeton University, Princeton, N. J.

Joel Stebbins, Professor of Astronomy, University of Illinois, Urbana, Illinois.

American Astronomical Society

W. W. Campbell, Director, Lick Observatory, Mt. Hamilton, California.

H. N. Russell, Professor of Astronomy, Princeton University, Princeton, N. J.

American Physical Society

H. A. Bumstead, Professor of Physics, and Director of the Sloane Physical Laboratory, Yale University, New Haven, Connecticut.

William Duane, Professor of Bio-Physics, Harvard University Medical School, Boston, Massachusetts.
VIII. DIVISION OF ENGINEERING

Honorary Chairman, Henry M. Howe.
Chairman, Comfort A. Adams.
Vice-Chairman, Galen H. Clavenger.

Executive Committee

Honorary Chairman, Henry M. Howe; Chairman, Comfort A. Adams; Vice-Chairman, Galen H. Clavenger; D. S. Jacobs; E. G. Sleebury.

MEMBERS OF THE DIVISION

Representatives of Societies

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Arthur M. Greene, Professor of Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, N. Y.
W. F. M. Goss, Past President of the American Society of Mechanical Engineers; President, Railway Car Manufacturers Association, 61 Broadway, New York City.
D. S. Jacobs, Head of Engineering Department, Babcock and Wilcox, 83 Liberty St., New York City.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Comfort A. Adams, Past President American Institute of Electrical Engineers, Lawrence Professor of Engineering, Harvard University, Cambridge, Massachusetts.
F. B. Jewett, Chief Engineer, Western Electric Company, 45 West Street, New York City.
W. R. Whitney, Director of Research Laboratory, General Electric Company, Schenectady, N. Y.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS

Joseph W. Richards, Professor of Metallurgy, Lehigh University, South Bethlehem, Pennsylvania.

AMERICAN SOCIETY OF CIVIL ENGINEERS

Anson Marston, Dean, and Director of Engineering Department, Iowa State College, Ames, Iowa.
H. H. Porter, President, American Water Works and Electric Co., 50 Broad St., New York City.
Geo. S. Webster, Director, Department of Wharves, Docks, and Ferries, Bourse Building, Philadelphia, Pennsylvania.

AMERICAN SOCIETY FOR TESTING MATERIALS


List of Committees

1. Committee on the International Astronomical Union.
Chairman, W. W. Campbell, Director, Lick Observatory, Mt. Hamilton, California.

2. Committee on the International Geophysical Union.
Chairman, William Bowes, Chief of the Division of Geodesy, U. S. Coast and Geodetic Survey, Washington, D. C.

3. Committee on Enlargement of the Functions of the International Bureau of Weights and Measures.
Chairman, S. W. Stratton, Director, U. S. Bureau of Standards, Washington, D. C.
Sub-committees on Wave-Length Standards for a Unit of Length.
Chairman, A. A. Michelson, Professor of Physics, and Head of the Department of Physics, University of Chicago, Chicago, Illinois.

4. Committee on Abstracts, Bibliographies, and Monographs.
Chairman, J. S. Ams, Professor of Physics, Johns Hopkins University, Baltimore, Maryland.

5. Committee on Physical Research. (These committees are now being organized.)
ILLUMINATING ENGINEERING SOCIETY

Edward P. Hyde, Director, Nela Research Laboratory, Nela Park, Cleveland, Ohio.

WESTERN SOCIETY OF ENGINEERS

Arthur N. Talbot, Past President, American Society of Civil Engineers, Professor of Engineering, University of Illinois, Urbana, Illinois.

SOCIETY OF AUTOMOTIVE ENGINEERS

Chas. F. Kettering, President, The Dayton Engineering Laboratories Co., Dayton, Ohio.

E. D. Adams, Fellow, American Society of Civil Engineers; Member, American Institute of Electrical Engineers, 72 Broadway, New York City.

J. J. Cart, Vice-President, American Telephone and Telegraph Company, 72 Broadway, New York City.

Galen H. Clavenger, Consulting Metallurgist, 29 West 59th St., New York City.


Henry M. Howe, Professor Emeritus of Metallurgy of California University, Bedford Hills, N. Y.


E. G. Spiess, Vice-President, Engineering Foundation, 29 Broadway, New York City.

Bradley Stoughton, Secretary, American Institute of Mining and Metallurgical Engineers, 29 West 59th St., New York City.

S. W. Stratton, Director, U. S. Bureau of Standards, Washington, D. C.

Ambrose Swasey, Manufacturer of Machine Tools and Astronomical Instruments, Warner-Swasey Company, Cleveland, Ohio.

William R. Walker, Assistant to the President, U. S. Steel Corporation, 72 Broadway, New York City.

A representative of the Government Division.

List of Committees

1. Committee on Elimination of Inclusions from Steel. Chairman, Henry D. Hibbard, 144 East Seventh St., Plainfield, N. J.
5. Committee on Fatigue Phenomena. Chairman, H. F. Moore, Professor of Engineering Materials, Engineering Experiment Station, University of Illinois, Urbana, Illinois.

IX. DIVISION OF CHEMISTRY AND CHEMICAL TECHNOLOGY

Chairman, W. D. Bancroft.
First-Chairman, Julius Steiglitz.

Executive Committee

Chairman, W. D. Bancroft; First-Chairman, Julius Steiglitz; A. B. Lamb, L. A. Noyes, C. L. Albers.

MEMBERS OF THE DIVISION

Representatives of Societies

AMERICAN CHEMICAL SOCIETY


W. D. Bancroft, Professor of Physical Chemistry, Cornell University, Ithaca, N. Y.

C. G. Derick, Research Chemist, National Aniline and Chemical Company, Inc., Buffalo, N. Y.

J. M. Franks, Chemist, Parke Davis Company, Detroit, Michigan.

E. C. Franklin, Professor of Chemistry, Leland Stanford Junior University, Stanford University, California.


John Johnston, Professor of Chemistry, Yale University, New Haven, Connecticut.

Julius Steiglitz, Professor of Chemistry, University of Chicago, Chicago, Illinois.
X. DIVISION OF GEOLOGY AND GEOGRAPHY

Chairman, E. B. Mathews.

Executive Committee


MEMBERS OF THE DIVISION.

Representative of Societies

ASSOCIATION OF AMERICAN GEOGRAPHERS

W. M. Davis, Professor Emeritus of Geography, Harvard University, Cambridge, Massachusetts.

N. M. Fenneman, Professor of Geography and Geology, University of Cincinnati, Cincinnati, Ohio.

J. Russell Smith, Professor of Economic Geography, University of Pennsylvania, Philadelphia, Pennsylvania.

AMERICAN GEOGRAPHICAL SOCIETY

Isaiah Bowman, Director, American Geographical Society, Broadway at 136th St., New York City.

A. M. Clarke, State Geologist and Palaeontologist; Director, State Museum, Education Building, Albany, N. Y.


R. A. Daly, Sturgis-Hayes Professor of Geology, Harvard University, Cambridge, Massachusetts.

H. E. Gregory, Silliman Professor of Geology, Yale University; Superintendent, Geological and Natural History Survey of Connecticut, New Haven, Connecticut.

A. C. Lawson, Professor of Mineralogy and Geology, University of California, Berkeley, California.

C. K. Leith, Professor of Geology, University of Wisconsin, Madison, Wisconsin.

PALEONTOLOGICAL SOCIETY


NATIONAL GEOGRAPHIC SOCIETY

Gilbert Grosvenor, Director and Editor, National Geographic Society, Washington, D. C.

Members at Large

Ralph Arnold, Economic Geologist, 925 Union Oil Bldg., Los Angeles, California.


A. L. Day, Director, Geophysical Laboratory, Carnegie Institution of Washington, Vice-Presidents, Corning Glass Works, Corning, N. Y.

Ellsworth Huntington, Research Associate in Geography, Yale University, New Haven, Connecticut.
DOUGLAS JOHNSON, Professor of Geology, Columbia University, New York City.
E. B. Mathews, Professor of Mineralogy and Petrography, Johns Hopkins University, State Geologist of Maryland; Director, State Weather Service, Baltimore, Maryland.
A representative of the Government Division.

List of Committees

2. Committee on Development of Geographical Sciences. Chairman, Ira B. Bowman, Director, American Geographical Society, Broadway at 156th Street, New York City.
10. Committee on Seismology. Chairman, Harry Fielding Reid, Professor of Dynamical Geology and Geography, Johns Hopkins University, Baltimore, Maryland.

XI. DIVISION OF MEDICAL SCIENCES

Chairman, Henry A. Christian.
Vice-Chairman, R. G. Hussey.

Executive Committee

Chairman, Henry A. Christian; Vice-Chairman, R. G. Hussey; Simon Flexner, William H. Howell, Reid Hunt, R. M. Pearce, F. F. Russell.

MEMBERS OF THE DIVISION

R. G. HUSSY, Associate in Pathology and Bacteriology, Rockefeller Institute for Medical Research, New York City.

Representatives of Societies

AMERICAN ASSOCIATION OF ANATOMISTS

CLARENCE M. JACKSON, Professor of Anatomy, and Director of the Department of Anatomy, University of Minnesota, Minneapolis, Minnesota.

AMERICAN ASSOCIATION OF PATHOLOGISTS AND BACTERIOLOGISTS

HOWARD T. KARNER, Professor of Pathology, Western Reserve University, Cleveland, Ohio.

AMERICAN NEUROLOGICAL SOCIETY

E. E. SOUTHERN, Professor of Neurology, Harvard University; Director, Boston Psychopathic Hospital, Boston, Massachusetts.

AMERICAN PHYSIOLOGICAL SOCIETY

W. H. HOWELL, Assistant Director, School of Hygiene, and Professor of Physiology, Johns Hopkins University, Baltimore, Maryland.

AMERICAN ROENTGEN RAY SOCIETY

AUGUSTUS W. CRANE, 420 South Rose Street, Kalamazoo, Michigan.

AMERICAN SOCIETY FOR CLINICAL INVESTIGATION

HENRY A. CHRISTIAN, Hersey Professor of the Theory and Practice of Physics, Harvard University; Physician-in-Chief, Peter Bent Brigham Hospital, Boston, Massachusetts.

AMERICAN SOCIETY FOR EXPERIMENTAL PATHOLOGY

PNYON ROCS, Associate Member, Rockefeller Institute for Medical Research, Department of Pathology and Bacteriology, New York City.

AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS

REID HUNT, Professor of Pharmacology, Harvard University, Boston, Massachusetts.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS

GRAHAM LUSK, Professor of Physiology, Cornell University Medical College, New York City.

AMERICAN SURGICAL ASSOCIATION

GEORGE W. CHILDE, Professor of Surgery, Western Reserve University, Cleveland, Ohio.

ASSOCIATION OF AMERICAN PHYSICIANS

W. S. THAYER, Professor of Medicine, Johns Hopkins University, Baltimore, Maryland.

NATIONAL DENTAL ASSOCIATION

THOMAS B. HARTKE, Professor of Oral Surgery, University of Minnesota, Minneapolis, Minnesota.

Members at Large

DAVID L. ESCHALL, Professor of Clinical Medicine, and Dean, Harvard University Medical School; Chief of Medical Service, Massachusetts General Hospital, Boston, Massachusetts.

JOSEPH ELLINGER, Professor of Physiology, Washington University, St. Louis, Missouri.

SIMON FLEXNER, Director of Laboratories, Rockefeller Institute for Medical Research, 66th Street and Avenue A, New York City.

FREDERICK P. GAY, Professor of Pathology, University of California, Berkeley, California.

G. C. HUBER, Professor of Anatomy and Director of Anatomic Laboratories, University of Michigan, Ann Arbor, Mich.
R. M. Pearce, Professor of Research Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

F. F. Russell, Colonel, Medical Corps, U. S. A., Army Medical School, Washington, D. C.

E. R. Stitt, Rear-Admiral, U. S. N., Commanding Officer, Naval Medical School, Washington, D. C.

V. C. Vaughan, Professor of Hygiene and Physiological Chemistry, and Dean of the Medical School, University of Michigan, Ann Arbor, Michigan.

William H. Welch, Director, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Maryland.

H. Gideon Wells, Professor of Pathology, University of Chicago, Director, Ortho S. A. Sprague Memorial Institute, Chicago, Illinois.

A representative of the Government Division.

List of Committees

1. Committee on Anatomy. Chairman, C. M. Jackson, Professor of Anatomy, and Director of the Department of Anatomy, University of Minnesota, Minneapolis, Minnesota.

2. Committee on Neurology and Psychiatry. Chairman, E. E. Southard, Professor of Neuropathology, Harvard University; Director, Boston Psychopathic Hospital, Boston, Massachusetts.

3. Committee on Medical Problems of Industry. Chairman, H. A. Christen, Hersey Professor of the Theory and Practice of Phyic, Harvard University; Physic-in-Chief, Peter Bent Brigham Hospital, Boston, Massachusetts.

XII. DIVISION OF BIOLOGY AND AGRICULTURE

Chairman, C. E. McClung.

Vice-Chairman, L. R. Jones.

Executive Committee

Chairman, C. E. McClung; Vice-Chairman, L. R. Jones; I. W. Bailey, F. R. Lillie, G. R. Lyman, H. F. Moore, A. F. Woods.

Members of the Division

Representatives of Societies

AMERICAN SOCIETY OF AGRONOMY


AMERICAN SOCIETY OF BACTERIOLOGISTS

Samuel C. Prescott, Professor of Industrial Microbiology, Massachusetts Institute of Technology, Cambridge, Massachusetts.

BOTANICAL SOCIETY OF AMERICA

William Crocker, Associate Professor of Botany, University of Chicago, Chicago, Illinois.


I. R. Jones, Professor of Plant Industry, University of Wisconsin, Madison, Wisconsin.

* Other committees are to be appointed.

ECOLOGICAL SOCIETY OF AMERICA

W. M. Wheeler, Professor of Economic Entomology, Bussey Institution, Harvard University, Forest Hills, Massachusetts.

SOCIETY OF AMERICAN FORESTERS

Barlington Moore, President, Ecological Society of America, 925 Park Avenue, New York City.

AMERICAN GENETICS ASSOCIATION


AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE

U. P. Hedrick, Horticulturist, New York Agricultural Experiment Station, Geneva, N. Y.

AMERICAN PHYTOPATHOLOGICAL SOCIETY


SOCIETY OF AMERICAN ZOOLOGISTS

M. F. Guyer, Professor of Zoology, University of Wisconsin, Madison, Wisconsin.

F. R. Lillie, Professor of Zoology, University of Chicago, Chicago, Illinois.

G. H. Parker, Professor of Zoology, Harvard University, Cambridge, Massachusetts.

Members at Large

I. W. Bailey, Professor of Forestry, Bussey Institution, Harvard University, Forest Hills, Massachusetts.

Vernon Kellogg, Professor of Entomology and Lecturer in Bionomics, Leland Stanford Junior University, Stanford University, California.

B. E. Livingston, Director of Laboratory of Plant Physiology, Johns Hopkins University, Baltimore, Maryland.

C. E. McClung, Professor of Zoology, and Director of Zoological Laboratory, University of Pennsylvania, Philadelphia, Pennsylvania.


A. G. Mayor, Director, Marine Biological Laboratory, Tortugas, via Key West, Florida.


J. R. Murnen, Professor of Physiology and Director of Vital Economics, University of Rochester, Rochester, N. Y.

W. H. Osgood, Assistant Curator of Mammalogy and Ornithology, Field Museum, Chicago, Illinois.

A. F. Woods, President, Maryland State College of Agriculture, College Park, Maryland.

A representative of the Government Division.

List of Committees

1. Committee to confer with the Division of Medicine on Anatomy. Special Committee. Chairman, A. F. Woods; President, Maryland State College of Agriculture, College Park, Maryland.
XII. DIVISION OF ANTHROPOLOGY AND PSYCHOLOGY

Chairman, W. V. Bingham
Executive Committee

Chairman, W. V. Bingham; Franz Boas, J. W. Fewkes, W. D. Scott, C. E. Searls

MEMBERS OF THE DIVISION

W. V. Bingham, Professor of Psychology, and Director of the Division of Applied Psychology, Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

Representatives of Societies

AMERICAN ANTHROPOLOGICAL ASSOCIATION

Franz Boas, Professor of Anthropology, Columbia University, New York City.
Roland B. Dixon, Professor of Anthropology, Harvard University, Cambridge, Massachusetts.


A. L. Kroeber, Curator of Anthropology, Museum of Anthropology, Professor of Anthropology, University of California, Berkeley, California.

Berthold Laufer, Curator of Anthropology, Field Museum of Natural History, Chicago, Illinois.

Clark Wissler, Curator of Anthropology, American Museum of Natural History, New York City.

AMERICAN PSYCHOLOGICAL ASSOCIATION

James R. Angell, Dean of the Faculty of Arts, Literature, and Science, and Head of the Department of Psychology, University of Chicago, Chicago, Illinois.

Raymond Dodge, Professor of Psychology, Wesleyan University, Middletown, Connecticut.

W. D. Scott, Professor of Psychology, Northwestern University, Evanston, Illinois, Associate Director, Bureau of Personnel Research, Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

C. E. Searls, Dean of the Graduate College, and Professor of Psychology, State University of Iowa, Iowa City, Iowa.

E. L. Thorndike, Professor of Educational Psychology, Teachers' College, Columbia University, New York City.

G. M. Whipple, Professor of Educational Research, University of Michigan, Ann Arbor, Michigan.

Members at Large

S. I. Franz, Scientific Director, Government Hospital for the Insane, Washington, D. C.

P. E. Goddard, Curator of Ethnology, American Museum of Natural History, New York City.

Aleks Hardwick, Curator of Physical Anthropology, American Museum of Natural History, New York City.

L. M. Terman, Professor of Education, Leland Stanford Junior University, Stanford University, California.
THE RESEARCH FELLOWSHIP BOARD

A sum, amounting to $500,000 for the period May 1, 1919, to June 30, 1925, has been pledged to be appropriated by The Rockefeller Foundation to the National Research Council for the maintenance of National Research Fellowships in Physics and Chemistry, under the direction of a Research Fellowship Board appointed by the Council of the National Academy of Sciences and the Executive Board of the National Research Council in joint session.

The members appointed on this Board serve for a period of five years. With the Chairman of the Division of Physical Sciences and of Chemistry and Chemical Technology, appointed annually, serve in an ex-officio capacity.

MEMBERS OF THE BOARD

Henry A. Bumstead, Professor of Physics and Director of the Sloane Physical Laboratory, Yale University, New Haven, Connecticut.

Simon Flexner, Director of Laboratories, Rockefeller Institute for Medical Research, 66th Street and Avenue A, New York City.

George F. Hale, Director, Mount Wilson Observatory, Carnegie Institution of Washington, Pasadena, California.

Elmer F. Kohler, Professor of Chemistry, Harvard University, Cambridge, Massachusetts.

Robert A. Millikan, Professor of Physics, University of Chicago, Chicago, Illinois.

Arthur A. Noyes, Professor of Theoretical Chemistry and Director of the Research Laboratory of Physical Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Wilder D. Bancroft, Secretary of the Board, Division of Chemistry and Chemical Technology, 1919-1920, Professor of Physical Chemistry, Cornell University, Ithaca, N. Y.

Charles E. Merendel, Chairman, Division of Physical Sciences, 1919-1920; Professor of Physics, University of Wisconsin, Madison, Wisconsin.

Fellowships have been awarded to the following persons, who have demonstrated a high order of ability in research, for the purpose of enabling them to conduct investigations at educational institutions which make adequate provision for research in physics and chemistry:

In Chemistry

F. R. Bichowsky
Edwin J. Cohen
Axel E. Olson
Warren C. Voelhig

In Physics

Ernest F. Barker
Arthur H. Compton
Robert A. Patterson

Emmet K. Carter
Morris Kharasch
Worth H. Rodebush
Albert E. Cassel
Leonard B. Loeb
George Porter Paine
THE NATIONAL RESEARCH COUNCIL

ANNOUNCEMENT

OF THE

DIVISION OF EDUCATIONAL RELATIONS

WASHINGTON, D. C.
August 15, 1919
THE NATIONAL RESEARCH COUNCIL

ANNOUNCEMENT

OF THE

DIVISION OF EDUCATIONAL RELATIONS

The great war over, the world faces a unique period of reconstruction and readjustments. There are great problems and great opportunities. Science proved its practical value, its indispensability, during the war. It was the aid of science that enabled Germany to carry on its formidable war effort as long as it did; it was science that enabled America and the Allies to overcome this effort. This is not to overlook the tremendous rôle played in the war by moral factors, by the human will to achieve, by national psychology and patriotism. But scientific knowledge and its application especially characterized the conduct of the war.

And, similarly, it will be to science that the world must turn for aid in meeting the after-war problems. We shall need to draw on all we know; we shall need to know more. Knowing more will depend on a renewed ardent pursuit of scientific study, scientific research. All possible stimulation and aid of such research are necessary; all possible opportunity must be given men of proved competence to carry it on; every attempt must be made to train and inspire younger men of natural capacity to become active investigators.

America, no less than Europe, faces a difficult and insistent social problem. Masses of people demand an amelioration of the practical difficulties which stand in the way of their well-being. Professor Arthur O. Lovejoy tells us the truth about the solution of this problem when he writes (The Review, July 5, 1919):

"The social problem is not primarily a problem of distribution, but of production. * * * If increase of production is the first article in the economic program of the rational social reformer, there can be no question as to what practical endeavors he will rank first in urgency and importance. For the means upon which we must chiefly rely for any increase of production worth having is
plain. It is only through progress in scientific knowledge and in the application of such knowledge to the satisfaction of men's needs and desires that the lot of the average man can be greatly bettered. To pile up material goods at the cost of greatly increased or intensified labor would, for the mass of mankind, mean no real gain. A good deal may no doubt be done by better organization of industry, by the avoidance of wasteful methods, and by the better education and increased efficiency of labor. But just as it is the work done during the past four hundred years by men in laboratories, in quiet studies, or in inventors' workshops, which is the primary source of most of the wealth by which modern Western society surpasses antiquity, the Middle Ages, or the Orient, so from these sources alone may we hope in the future to gain any substantial and cumulative increase in the means of well-being."

THE NATIONAL RESEARCH COUNCIL
OFFICERS

JAMES R. ANGELL, Chairman,
Dean of the Faculties of Arts, Literature, and Science, and Head of the Department of Psychology, University of Chicago, Chicago, Illinois.

CHARLES D. WALCOTT, First Vice-Chairman,
Secretary, Smithsonian Institution; President, National Academy of Sciences, Washington, D. C.

GANO DUNN, Second Vice-Chairman,
President, J. G. White Engineering Corporation, 43 Exchange Place, New York, N. Y.

R. A. MILLIKAN, Third Vice-Chairman,
Professor of Physics, University of Chicago, Chicago, Illinois.

F. L. RANSOM, Secretary.
Geologist, United States Geological Survey, Washington, D. C.

The National Research Council is established by an Executive Order of the President of the United States, issued May 11, 1918, perpetuating under the auspices of the National Academy of Sciences the organization of the National Research Council which the Academy inaugurated in 1916 by the authority of its congressional charter as a measure of national preparedness. During the spring of 1919 the Council has been permanently reorganized on a peace basis.

The purposes of the National Research Council are thus stated in the articles of organization:

"It shall be the purpose of the National Research Council to promote research in the mathematical, physical, and biological sciences, and in the application of these sciences to engineering, agriculture, medicine, and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare."

The membership of the Council consists of:
1. Representatives of national scientific and technical societies.
2. Representatives of the United States Government.
3. Representatives of other research organizations, and other persons whose aid may advance the objects of the Council.

The organization of the Council provides for a central governing body, the Executive Board, and for thirteen divisions as follows:
A. Divisions of General Relations:
   I. Government Division.
   II. Division of Foreign Relations.
   III. Division of States Relations.
   IV. Division of Educational Relations.
   V. Division of Industrial Relations.
   VI. Research Information Service.
B. Divisions of Science and Technology:
   VII. Division of Physical Sciences.
   VIII. Division of Engineering.
   IX. Division of Chemistry and Chemical Technology.
   X. Division of Geology and Geography.
   XI. Division of Medical Sciences.
   XII. Division of Biology and Agriculture.
   XIII. Division of Anthropology and Psychology.

Membership in each of these divisions is made up of representatives of institutions, associations, and other educational, industrial, and governmental agencies which are severely concerned with the special fields of activity of the divisions, and of certain members at large chosen from the leading men of the various lines of work represented. The chairman of each division will be elected annually and the other members of the division are appointed for periods varying from one to three years.
THE DIVISION OF EDUCATIONAL RELATIONS
OFFICERS

Vernon Kellogg, Chairman.
Professor of Entomology and Lecturer in Bionomics, Leland Stanford
Junior University, Stanford University, California.

Albert L. Barrows, Executive Secretary,
1201 Sixteenth St. N. W., Washington, D. C.

MEMBERS OF THE DIVISION
Representing other Organizations

For the Association of American Colleges
Donald J. Cowlind, President, Carleton College, Northfield, Minnesota.

For the Association of American Universities
A. Ross Hill, President, University of Missouri, Columbia, Missouri.

For the American Association of University Professors
E. Percival Lewis, Professor of Physics, University of California, Berkeley,
California.

For the National Association of State Universities
Frank L. McVey, President, University of Kentucky, Lexington, Kentucky.

For the United States Bureau of Education
S. P. Capen, Specialist in Higher Education, United States Bureau of Education,
Washington, D. C.

For the Research Fellowship Board of the National Research Council
Simon Flexner, Director of Laboratories, Rockefeller Institute for Medical
Research, 66th Street and Avenue A, New York, N. Y.

At Large
Abraham Flexner, Secretary, General Education Board, 61 Broadway, New
York, N. Y.

H. E. Gregory, Silliman Professor of Geology, Yale University, New Haven,
Connecticut.

A. O. Leuschner, Professor of Astronomy and Director of the Students' 
Observatory, University of California, Berkeley, California.

J. C. Merriam, Professor of Paleontology and Historical Geology, University 
of California, Berkeley, California.

H. S. Pritchett, President, Carnegie Foundation for the Advancement of
Teaching, 570 Fifth Avenue, New York, N. Y.

R. M. Yerkes, Chairman, Research Information Service, National Research
Council, Washington, D. C.

The attitude of the Division of Educational Relations toward
the opportunities and work that lie before it is based upon the
principle that a fundamental factor in the advancement of
learning and of civilization, in so far as this is dependent upon

education, is ability to conduct research progressively. The
form and method of education must, for the best results to the
nation, involve a recognition of this principle. Our institutions
of higher learning should be both sources of actual new knowl-
edge and sources from which shall come men and women with
inspiration and special training to recruit the ranks of active
investigators. In America, despite a generous provision of
special institutions and organizations for the encouragement
and carrying on of scientific investigation, the large majority
of research workers are to be found in the universities and
colleges, and it is also on these institutions that we depend for
the development of new workers. It is in the universities and
colleges especially, therefore, that must exist the atmosphere
and the opportunity favorable to the stimulation and activity
of scholars and developing scholars.

This Division has undertaken to make a survey of the condi-
tions in American educational institutions and in American
education in general, which bear especially upon the possibili-
ties of actual research and the encouragement and training
of youths of natural capacity for investigation. Especially
important among these conditions is the attitude of university
authorities toward teachers and their work and the dispo-
sition of their time and energies; the funds and equipment
available for research work; the aid to advanced students
in the way of supporting research fellowships and scholarships;
and the opportunities for competent investigators to find per-
manent positions in which their work can go on without too
much other demand on their time and attention.

What are the special features or traditions in American edu-
cational institutions and American educational methods that
promote or impede research? Can the research worker do even
in and in hand? Or must he content himself with the student only one or the
other? What are the limits of the student's natural capacity for
research? And how soon may he be supposed to have the
amount of research he needs?

The Division of Educational Relations asks for the coopera-
tion of the university and college authorities in its attempt to
find out what it can concern the conditions as they exist
THE DIVISION OF EDUCATIONAL RELATIONS

OFFICERS

VERNON KELLOGG, Chairman,
Professor of Entomology and Lecturer in Bionomics, Leland Stanford
Junior University, Stanford University, California.

ALBERT L. BARROWS, Executive Secretary,
1201 Sixteenth St. N. W., Washington, D. C.

MEMBERS OF THE DIVISION

Representing other Organizations:

FOR THE ASSOCIATION OF AMERICAN COLLEGES
DONALD J. COWLING, President, Carleton College, Northfield, Minnesota.

FOR THE ASSOCIATION OF AMERICAN UNIVERSITIES
A. ROSS HILL, President, University of Missouri, Columbia, Missouri.

FOR THE AMERICAN ASSOCIATION OF UNIVERSITY PROFESSORS
E. PERCIVAL LEWIS, Professor of Physics, University of California, Berkeley,
California.

FOR THE NATIONAL ASSOCIATION OF STATE UNIVERSITIES
FRANK L. MCVYER, President, University of Kentucky, Lexington, Kentucky.

FOR THE UNITED STATES BUREAU OF EDUCATION
S. P. CAPPEN, Specialist in Higher Education, United States Bureau of Education,
Washington, D. C.

FOR THE RESEARCH FELLOWSHIP BOARD OF THE NATIONAL RESEARCH COUNCIL
SIMON FLEXNER, Director of Laboratories, Rockefeller Institute for Medical
Research, 66th Street and Avenue A, New York, N. Y.

AT LARGE

ABRAHAM FLEXNER, Secretary, General Education Board, 61 Broadway, New
York, N. Y.

H. E. GREGORY, Silliman Professor of Geology, Yale University, New Haven,

HERBERT HOOVER, Ex-United States Food Administrator, and Trustee,
Stanford University, California.

Council, Washington, D. C.

The attitude of the Division of Educational Relations toward
the opportunities and work that lie before it is based upon the
principle that a fundamental factor in the advancement of
learning and of civilization, in so far as this is dependent upon
education, is ability to conduct research progressively. The
form and method of education must, for the best results to the
nation, involve a recognition of this principle. Our institutions
of higher learning should be both sources of actual new knowl-
edge and sources from which shall come men and women with
inspiration and special training to recruit the ranks of active
investigators. In America, despite a generous provision of
special institutions and organizations for the encouragement
and carrying on of scientific investigation, the large majority
or research workers are to be found in the universities and
colleges, and it is also on these institutions that we depend for
the development of new workers. It is in the universities and
colleges especially, therefore, that must exist the atmosphere
and the opportunity favorable to the stimulation and activity
of scholars and developing scholars.

This Division has undertaken to make a survey of the condi-
tions in American educational institutions and in American
education in general, which bear especially upon the possibili-
ties of actual research and the encouragement and training
of youths of natural capacity for investigation. Especially
important among these conditions is the attitude of university
authorities toward teachers and their work and the dis-
position of their time and energies; the funds and equip-
ment available for research work; the aid to advanced students
in the way of supporting research fellowships and scholarships;
and the opportunities for competent investigators to find per-
manent positions in which their work can go on without too
much other demand on their time and attention.

What are the special features or traditions in American educa-
tional institutions and American educational methods that
tend to encourage or discourage productive research? Can
specialization and general culture go hand in hand? Or must
the decision be made to offer to a given student only one or the
other? How early may the student's natural capacity for
becoming an investigator be discovered and how soon may he
be started on the special training which he needs?

The Division of Educational Relations asks for the cooper-
tion of the university and college authorities in its attempt to
find out what it can concerning the conditions as they exist
to-day with regard to research opportunity and activity in their institutions in the hope that this knowledge may help the National Research Council in its desire to be of all possible assistance to the universities in their endeavor to foster American research. This assistance may lie in the way of some practical encouragement of cooperative effort among the universities and of making available increased facilities for investigation. The Council's recently established research fellowships in physics and chemistry are a case in point. In trying to render this assistance the Council has no intention of attempting any slightest interference with control of university affairs. Its possible field of helpful activity must be chiefly determined by the suggestions and requests of the universities themselves.

[Signature]

Chairman
Division of Educational Relations
National Research Council
Dear Sir:

I am sending you, inclosed, copy of a report recently made by Dr. J. C. Merriam, lately professor of paleontology and historical geology and dean of the faculty in the University of California, and now president elect of the Carnegie Institution of Washington, as chairman, in 1919-20, of the Research Committee of the University of California. This report succinctly explains the organization and activities of a university research committee which may fairly be referred to as a model, and reveals the practical possibilities of such a committee in the way of promoting research in an educational institution.

The Division of Educational Relations of the National Research Council believes that the institution of active research committees, carefully selected as to personnel, can be of the utmost assistance in the encouragement of actual research, the training of research workers, and the development of a vital research spirit in the colleges and universities of the country.

The fundamental seat of research in America is not in the laboratories of industry and invention, nor even in the admirable special research institutions of the country, but in the colleges and universities. For not only is the major part of American scientific invention done in them but also practically all the training of new research workers. Any means, therefore, of encouraging and developing research, the training for research, and the research spirit in the colleges and universities is of the greatest
I am sending you, therefore, copies of a report recently made by Dr. J.
C. Wilen, former professor of bacteriology and industrial hygiene and
member of the faculty in the University of California, and our previous
appearance to the Research Committee of the University of California. The report
of the Research Committee of the University of California. The report
summarizes the activities of the organization and indicates some of the principal
concerns with which we have been associated in recent years. The report
contains a comprehensive outline of the work of the research committee in an

...scientific institution...

The Division of Research of the University of California...

...in addition the Institution of science research committee...

...in the interest of the University, can do of the research association in the...

...concerned in the training of research workers, and the...

...development of a new research facility in the college and university...

...the committee...

...the importance of research in America is not in the future...

...of the country, but in the colleges and universities...

...not only to do work of a fundamental character, but also in its...

...pursue the research work in the colleges, and universities...

...research and development of fundamental and applied research, the...

...and the research spirit in the colleges and universities of the United...
importance to the country, for continued and expanding research is essential to our national well-being and strength.

The National Research Council, therefore, urges the establishment and strong administrative support of research committees in all educational institutions of the country in which there is any possibility at all of carrying on research or of training research workers. About fifty such research committees, of which yours is one, are now in existence. There should be many more. Even where these committees cannot be given the financial support which the University of California has been able to give and has so wisely given its committee, they can yet exercise influence in stimulating and encouraging research in these institutions through moral support. There are such committees in certain colleges and universities which by the strength derived from the innate instinct and enthusiasm for creative scholarship possessed by their members, have been able, in a most natural way, to build up an opinion strongly supporting research as a justifiable function of faculty members, and to develop a point of view favoring research activity which has come to permeate the whole system of teaching in their institutions.

The Division of Educational Relations of the National Research Council hopes to set up friendly contact with the university or college research committees of the country and to that end invites correspondence and suggestions from such committees.

Very truly yours,

Vernon Kellogg

Chairman, Division of Educational Relations
National Research Council
The National Research Council

Expanding the opportunities of research, education, and training for graduate students and post-doctoral fellows is essential.

The National Research Council, in cooperation with the National Science Foundation, is establishing the Graduate Education and Training Program (GETP) to provide opportunities for graduate students and post-doctoral fellows to gain research experience in the latest areas of scientific endeavor.

An important aspect of the GETP is the establishment of a National Advisory Committee on Graduate Education and Training. This committee will provide guidance and advice on the development and implementation of the GETP.

The committee will consist of representatives from various disciplines and will work closely with the National Science Foundation to ensure the success of the GETP.

I wish to express my appreciation to the committee for their dedication and hard work.

Very truly yours,

[Signature]

Division of Educational Exchange
National Research Council
Dr. Harry Pratt Judson,
President, University of Chicago,

Chicago, Illinois.

Dear Sir:

Please find enclosed herewith copies of an announcement of the establishment of a system of National Research Fellowships in Physics and Chemistry, to be supported by the Rockefeller Foundation, and to be administered by the National Research Council. A number of forms to be used by applicants for the Fellowships are also enclosed.

Will you be good enough to transmit copies of the announcement and form of application to the professors of physics and chemistry in your institution with the request that they make known this new opportunity to anyone now or formerly connected with their departments who in their opinion has shown exceptional aptitude for research and who might desire to apply for one of the Fellowships.

You may also desire to bring the matter to the attention of your Faculty and students, on account of the general interest which attaches to it.

Very truly yours,

[Signature]

Chairman,
National Research Council.

Washington, D.C.,
March 29, 1919.
Chicago, April 1, 1919

Dr. Harry Pratt Judson,
President, University of Chicago,

Dear Mr. Hale:

Chicago, Illinois.

Yours of the 29th of March with enclosures

was duly received, and I have placed the material in the
Please find enclosed herewith copies of an announcement of
hands of Messrs. Nicholson and Stieglitz. I need not
tell you how much gratified I am at the opening of this

Physics and Chemistry, to be supported by the Rockefeller Foundation,
new plan, which I am sure will have very far-reaching and
and to be administered by the National Research Council. Number of
fruitful results,

forms to be used by applicants for the Fellowships are also enclosed.

With best regards, I am,

Will you be good enough to transmit copies of the announce-

ment and form of application to the professors of physics and chemistry

in your institution with the request that they make known this new op-

portunity to anyone now or formerly connected with their departments

who in their opinion has shown exceptional aptitude for research and

who might desire to apply for one of the Fellowships.

You may also desire to bring the matter to the attention of

Professor George E. Hale
National Research Council
1023 Sixteenth St.
Washington, D.C.

Very truly yours,

George E. Hale
Chairman,
National Research Council.
of the Office of the Secretary of State for War, with an occasion.

Dear Mr. Hitler,

I am writing to express my concern regarding the recent developments in your country. The continued aggression and violation of international law is a cause for serious concern.

I understand the importance of maintaining a strong defense, but it is equally important to adhere to international agreements and respect the sovereignty of other nations.

I urge you to consider the consequences of your actions and to pursue a path of peace and cooperation. The safety and stability of the world depend on it.

Yours sincerely,

[Signature]

Secretary of State for War
NATIONAL RESEARCH COUNCIL

National Research Fellowships in Physics and Chemistry
Supported by the Rockefeller Foundation

Fellowship Regulations.

Research Fellows are expected to devote their entire time to their researches for the term of their appointments (with vacation periods aggregating in general not more than six weeks a year), except that during the college year they may at their option give a portion of their time, in general not more than one-fifth (outside preparation included), to teaching of educational value to themselves or to attendance upon advanced courses of study. Fellows are expected not to engage in work for remuneration during the term of their appointment.

Fellowship appointments are subject to the condition that, after they are accepted by the applicant, they will not be vacated within the year without the consent of the Research Fellowship Board.

Fellows who desire to change the subjects of their researches or the educational institutions at which they are conducting them are expected to communicate with the Fellowship Board before making such changes.

Fellows are expected to submit to the Board shortly before the first of April of each year, and at such other times as may be desired by the Board, a detailed report on the progress of their researches. Fellows must also present an account of their researches in form for publication before withdrawing from the Fellowship. It is understood that all results of investigation by the Fellows be made available to the public without restriction.

Washington, D. C.
May 10, 1919.
National Research Council

National Research Fellowships in Physics and Chemistry

Supported by the Rockefeller Foundation

Fellowship Regulation

Researeh Fellows are expected to devote their entire time to full researeh for the term o their appointment.\(\text{wip nationon partime researeh is possible in general, not more than six weeks a year)}\) expect that during the College year they may at their option give a portion of their time in general research of the College nature to prepareose or to attendse a course or study. Fellows are expected not to engage in work for remuneration during the term of their appointment.

Fellowship appointments are subject to the condition that after they are accepted by the Council, they will not be availed within the year without the consent of the Research Board.

Fellowship Board

Fellows who are ready to advance the studies of their research on and are expected to communicate with the Research Board, to make plans and arrange for such visits that will be possible after the receipt of April of each year and at such time as may be agreed by the Board. A fall year report on the progress of their research will be sent to the Research Board. It is understood that all communication to the Research Board should be made available to the public without restriction.

Washington, D.C.
May 10, 1946.
President Harry Pratt Judson,
University of Chicago,
Chicago, Illinois.

My dear President Judson:

Professor Vernon Kellogg wishes me
to thank you for the very careful attention which
you have given to the questionnaire upon research
conditions in American colleges and universities
recently sent you by the Division of Educational
Relations of the National Research Council.

Sincerely yours,

[Signature]

Secretary, Division of
Educational Relations

Enclosure
November 7, 1949

To the President of the National Research Council:

I am pleased to report to you the fruit of the deliberations of the committee which has been studying the need for increased facilities for research in the Universities and Colleges of the United States.

I am grateful for the assistance given me in this study and the help extended by the members of the committee. I am also grateful for the encouragement and support which you have given to the work of the division of research of the National Research Council.

Sincerely yours,

[Signature]

Secretary, Division of Research Relations
Chicago, May 14, 1919

Dear Mr. Michelson:

At the meeting of the Board of Trustees yesterday the general principles for a Research Institute in Physics and Chemistry in the University of Chicago as presented in the report of the Committee consisting of yourself and Messrs. Stieglitz and Millikan were approved, and I shall be glad to confer with you at any time as to details. Of course the suggestions in your report I take as simply suggestive.

Very truly yours,

H.P.J. — L.

Mr. A. A. Michelson
The University of Chicago
Dear Mr. McGregor:

At the meeting of the Board of

the Committee on Graduate Study and Research in the Department of

the University of Chicago, I expressed my concern that

the suggestions made by Mr. E. H. H. and Mr. W. E. H. were not being followed.

If there is any information you can give me as to what action you have taken

in response to the suggestions in your report I hope you will let me know.

Very truly yours,

H. P. C.