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### THE NATIONAL RESEARCH COUNCIL.\*

BY C. E. MCCLUNG, PH. D.<sup>1</sup>

The National Research Council is a novel institution, something new in our national life; a thing full of the very greatest promise for scientific research and I sincerely hope that there may be coming out of the discussion here some means by which the American Pharmaceutical Association may be brought into a position to engage in research work in connection with our organization.

I will sketch briefly over the history of the Council. Doubtless many of you are more or less familiar with it, but every day those connected directly with its operation find that something new comes up. I think it would be wise therefore if I did not assume, on your part, too much knowledge concerning this organization. It is one of the "war babies" and came into existence through the necessity of our Country meeting the highly organized scientific research work of our recent enemy. The Council is not so recent, however, in one sense. During the Civil War the Government of this country felt the need of advice from scientific people and President Lincoln called into existence the National Academy of Science. The Academy was to advise the Government in problems of science and art, and has served very effectively during and since the Civil War. I recall, for instance, the Forest Service which was established through the advice of this scientific body.

When it seemed that we were being drawn into the world war, President Wilson called upon the National Academy to prepare itself for service again, and on this occasion the men in charge felt that it would be most advisable to enlarge in their connections. The Academy is not a large body and has grown to be a sort of honorary society, and was therefore not of sufficient size to accomplish the purpose which the President wished to carry out. Accordingly the Academy advised that there be created an auxiliary body to be called the National Research Council. The President accepted this advice and asked the Academy to organize such a body. This was done by the most direct means possible. The Academy called scientific men of prominence from all parts of the country to Washington and put them to work or allowed them to remain where they were in

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<sup>1</sup> Chairman Division of Biology and Agriculture, National Research Council.

their laboratories, placing them wherever they could serve most effectively. This method was the best possible to bring our scientific forces rapidly together into the service of the country.

After this had been going on for a year or more the President saw the effectiveness of the organization and conceived the idea that it would be very well to continue it. Accordingly, by an executive order, he perpetuated the Council as a permanent organization, under the charter of the National Academy of Sciences. You see, therefore, that the Council at the present time is under the charter of the National Academy of Sciences, and operates also by virtue of the executive order of President Wilson. It has as its object to promote scientific research in every way possible, to stimulate scientific endeavor, and to advise the Government whenever called upon. It is to have in mind always the possibility of another war, so that our scientific forces may readily be mobilized. That is the nature of the organization, then. It is a perpetual body under those two conditions.

After the war was over, it seemed to those who had been in contact with the work of the Council, that the form of organization was not one which would be most effective in peace time. In fact it was most autocratically organized as a body, and since this country had gone into the war to save the world for Democracy, it seemed quite improper that this organization should be on any other basis. Accordingly, a reorganization of the Council was decided upon and then it became necessary to determine the best basis on which this should be carried out.

There were two possible plans of organization. It was thought that we might organize on the basis of the American Association for Advancement of Science and it was also thought that we might thus use the national scientific societies. The latter was decided upon, the reason being that these societies generally have a research requirement for membership and since this is a research council, it seemed to be the proper thing to utilize them. Accordingly the present Council is founded upon the national scientific societies as units of organization. I would like to make that quite clear, because, you see, there is necessarily imposed on the Council certain limitations by this form of organization. We have accepted the natural grouping of the scientific men as a basis on which to organize the National Research Council. Therefore any changes which are made must come by recommendation of these organizations.

I will next tell you just how these scientific men are brought into contact with each other. First, however, I will state that there are six general divisions representing the general relations of the Council, and seven divisions representing the different sciences and technical branches. I shall speak of the latter first, because, as I have told you, they exhibit the basis of our organization. We have seven of these: Division of Chemistry and Chemical Technology; Division of Physics, Astronomy and Mathematics; Division of Engineering; Division of Medicine; Division of Geology and Geography; Division of Psychology and Anthropology; Division of Biology and Agriculture.

You will now understand that these are not simple bodies. Most of them are combinations, for it was the purpose of the Council to bring together rather than to separate; to integrate rather than to distribute. Accordingly we have the group of Biology and Agriculture, which in many ways holds subjects not strictly comparable, but which is an outgrowth of the war organization. In general the present situation in the Council is the result of the practical experience of the war, and these subdivisions as we have them now, represent the groups which naturally came about as a result of the necessities of war.

To illustrate the nature of one of these divisions I will tell you about the Division of Biology and Agriculture, of which I happen to be the chairman and of which I know most. We have there represented ten different societies, all of which have a research requirement for membership, and these send men chosen to represent them in the Council, elected to the Division. There are twenty-four members and some of the societies—the large ones—have a greater representation

than the more specialized ones. For instance, the botanists, through the American Botanical Society, elect three, the bacteriologists one, and phytopathologists one. The reason for this discrepancy is that the Botanical Society includes practically all the membership of these special societies and it is only necessary to have a small representation of the special interests.

We get together, then, in a group of fourteen men, coming directly from these societies and in order that there may not be a lack of representation of interests, regions, or persons even, there is provided a membership-at-large of ten. These members are chosen directly by the representatives of the different societies, so the entire twenty-four are selected by the societies, either directly or indirectly through their representatives. You can see, therefore, that the membership is democratically chosen. This group of twenty-four assembled a year ago and selected a chairman, a vice-chairman, and an executive committee. The Division has not met since last year—it will come together May 8, 1920,\* for the second time. The reason for these infrequent meetings is that it is very expensive to bring to Washington 24 men who are scattered all over the country and the Executive Committee of the Division can get together relatively inexpensively and more frequently. This Executive Committee, then, is really the functioning part of the organization. The policies are determined by the entire group and they are carried out by the Executive Committee.

The chairmen of Divisions have their residence in Washington and they receive a salary. Most of them are men from universities on leave of absence for the year. It is designed to have these officers changed frequently, in order that there may be no possibility of developing here in Washington a group which will tend to dominate the affairs of the Council, or operate independently without consulting the societies. The members are elected for three years and may not be re-elected until a year has elapsed. You see, therefore, that the Council is designed to move rapidly and to be very flexible, in order that we may not have a fixed body, and also in order that men may come here and get acquainted with the Council, and the methods of carrying on its work and then go back to their own institutions, and take the work of the Council and its methods with them. This then gives you an idea of the nature of one of the divisions.

The Council as a whole never gets together, because there are thirteen Divisions, each of about twenty-four members and if they were all brought together they would not be a very functioning body. There is, therefore, provided an Executive Board, which has as its members the chairmen of the different Divisions, and representatives of the Council. This Executive Board functions for the Council as a whole, as do the executive committees of the different Divisions.

Besides these seven divisions of science and technology, of which I have spoken, we have six general divisions. We have, thus, a Government Division and the members in the Government Division are chosen by the President of the United States. They represent the various scientific departments of the Government officially in the Council and we hope very much that the Government Division may grow into a most effective organization to connect the Government scientific agencies with the scientific people of the country. There are very great possibilities here, I think you will see.

Then we have a Foreign Relations Division, which relates the Council in this country to corresponding councils in the allied countries which have either been organized or which are just being organized.

We have the States Relations Division which is intended to relate the Council to similar organizations in the states. We hope that soon there may be in every state a council related to the national body in Washington, which will bear to the Council somewhat the same relation as the State Legislatures do to the National Congress.

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\* Address delivered May 6.

Then we have a Research Information Service and it does a part of the work of the National Council which may be of very great service to us. It is the purpose of this Division to accumulate and have on file all kinds of scientific information which may be valuable in our research interests. Just now the Division is engaged in gathering together information about three particular things. We want to know where the laboratories are in the country where scientific research is being conducted, and it has already been discovered that there are about 7,000 of these. It is necessary to know the character of the people working in those laboratories and accordingly there has been sent out by the Research Information Service a questionnaire, asking for certain information about personal matters, items such as you find in "American Men of Science." Next, it is desired to find out just what are the scientific projects which are being carried on. It is hoped that we can get together complete information with regard to the researches being conducted in the country.

You can readily see how it would be quite possible with this information on file to prosecute our investigations much more effectively than is done at present. There are so many possibilities here that I cannot even stop to enumerate them. They will readily suggest themselves to you. Since we are a scientific organization we feel that it is necessary to have these facts before we decide upon any policy and it is hoped by Dr. Yerkes, the chairman of this Division, that we may gain sufficient support for this service so that there can be installed a mechanical sorting system, such as the Census Bureau has, for getting out information of any character from this assembled mass. It would then be quite possible for any of you within a few days to get full information regarding the people, the laboratories and the projects relating to one on which you might be engaged.

Then we have another division—the Educational Relations Division—the purpose of which is to relate the National Research Council to our educational institutions, and the forty or more addresses which I have given this year before various bodies have been largely on behalf of this Division. The General Education Board gave Dr. Kellogg a grant of \$10,000, with which to make a survey of conditions in our educational institutions, and this is to be conducted from the standpoint of the investigator in an impartial, constructive spirit. We do not go about to find fault with the existing conditions or methods or anything of that sort. We simply go to ask what are the conditions and to help to determine what could be done to better these. Altogether, over a hundred institutions have been visited personally in this way and information has been gathered from them regarding actual conditions. When we have this information, for the first time, we will be able to say authoritatively that conditions are bad or good; are as good as possible or could be improved in this, that, or the other way. It will so represent conditions that the responsibility for them will rest with the educators and executives themselves rather than with the Council. I think you will see that there are great possibilities in any such arrangement as this.

Now, by this time you must want to know how an organization of this kind can continue in operation. During the war, of course, we received money from the Government and the only purpose involved there was to get definite results as quickly as possible. At present no money is received from the Government at all. The Council is not a Government organization, although as I have told you, it operates under the charter of the National Academy. It is not bound in any way by Government regulations. It is an entirely free organization. But to work there must be money, and we were fortunate in convincing, during the war, certain of the foundations, that the scientific people could properly expend money. Accordingly, the Carnegie Foundation made an endowment of \$5,000,000.00 to the Council with which to keep it in operation. One million of this five million dollars, it is stipulated, shall go into the erection of a building. You can naturally imagine that a lot of scientific people, being suddenly confronted by the prospect of five million dollars, would rather hesitate about putting a million dollars into

a building. We would rather have done some other thing with the money, if we had been free in the matter. We could have done without the building for a while at least, but since we got the gift of the five million dollars, including the building, we very thankfully accepted the condition. Perhaps there is something to the position of the persons who gave us this five million dollars, that if we have some concrete evidence that we are really going to be in business, there may be

Mr. Root, who is so well known to all of us, has been very much interested in getting this fund for the Council. He stated recently that the scientists had organized almost everything effectively except themselves, and said that he hoped more money coming to us. At any rate that is the situation and we must accept it. They would succeed now in getting themselves properly organized.

You can see, therefore, that on this basis the Council is an experiment, financed by this corporation, to see to what extent the scientists of the country can bring themselves together, for the furtherance of scientific research. I think that if you describe the Council in any one word you might say that it is an *opportunity*. It is an organization, provided through which we may ourselves do things, and that is the essential point for us all to realize—especially, those who are not directly connected with the Council, and who think the men in Washington are doing things for them, and not they for themselves. It has to be coöperative. It will go only as far as the people who are interested in it make it go. That is one reason why I speak to you, that it may be possible for you, *as an organization of pharmacists*, to see a way in which you can be brought together with this Council. It may mean much to us if you are successful.

This five million dollars which we have received is only in the nature of an experiment, and if we demonstrate the capacity to organize and conduct successfully the plans which have been formulated we will be supported financially. We have not only these foundations as a source of support, but many industries will help us—we have indeed already received some considerable support from industries. The Council is not in the nature of a purely theoretical organization which has no concern for practical application. In fact it is the avowed purpose of the Council to put science to the service of the country. In that connection, you see, we do not avoid practical relations but rather seek them. We try to relate the requirements of the industries to the achievements of research work.

It is apparent to all that the industries have prospered greatly by the onward march of the sciences and have given little back. In fact, they have been parasitic upon science. They draw out from our laboratories with their large salaries the very best men they can get, and they are causing educational institutions to face a very serious problem. They are putting up larger salaries than schools are offering and the teaching forces are drawn away. It is going to be necessary to protect ourselves against the inroads of the industries. We must come to an understanding with them. They must see that they are depriving themselves of the future sources of supply and that it is to their interest to support the development of this investigation work.

The Rockefeller Foundation has been convinced of this fact through the efforts of the Council, and in other ways, and it has appropriated \$500,000 to be expended within the next five years to support research fellows in physics and chemistry. These fellowships are to go largely to men with a Ph.D. degree. It is hoped that we can offer them sufficient support so that they will not wish to go out into the industries, but will become thoroughly interested in university work. At any rate there is this much to be said—there will be several more physicists and chemists in the universities after this than there would have been except for the establishment of this \$500,000 fund. This year, I believe, there are about fourteen fellows, and the stipends they are receiving run between one and three thousand dollars. This again is an experiment to see what the Council can do. In addition to the five million dollar endowment we have received approximately a million dollars to be

expended, five hundred thousand dollars of it being in this grant from the Rockefeller foundation.

You might now think that there are considerable sums of money to be used for research but as a matter of fact the endowment will just be sufficient to keep the machinery running. There will, from this endowment, be no funds to put into researches. You may think that that is unfortunate, and in some way it is, but I believe in the long run it will be better that the Council should not have general funds given to it. It would be quite impossible to raise the money for projects already suggested to the Council—the necessary amounts run into the billions of dollars. The failure to support meritorious projects would only engender a great deal of trouble for the Council. Many persons would be disappointed if the projects which they presented were not financed and they would become displeased with the organization. Therefore, under the present arrangement, every project which comes before the Council has first to have itself backed up by the judgment of the particular group to which it is related; it must then be referred to the larger group in the Division and obtain its approval, and finally the approval of the Council, representing all the sciences, must be obtained before any action can be taken.

If an industry is involved we have to go to that industry and say: "Here is a project which will either directly or indirectly benefit you, and you should support it." Any money which is given, however, is received without restrictions and there is nothing done in the way of favoring an industry by the Council. I am mentioning that fact particularly so that you can see that there will be no influence of specific industries on the work of the Council. This is very important. I have now tried to give you an outline of the work of the Council and of its organization. I think that it is possible for me to suggest a few ways in which your organization could come into relation with the Council. I can only do this *unofficially*, of course, and I am going to do it because I am interested in pharmacy. You see from the nature of the Council that it will be necessary for you to come as an organization with some definite promise of research work, so that you may be considered in relation to the Council's organization and its work as a whole. It happens that pharmacy is related to botany, chemistry, physics, and many other subjects and especially to medicine, and it would, therefore, hardly be possible to relate pharmacy to any existing Division very directly. It might, however, be handled as was agriculture in relation to biology. In some way pharmacy was not involved in the early organization of the Council. I do not know why that was, because I was not connected with it in the earlier days. But you do have contact with the medical side of the Council and you might take up through Dr. Reid Hunt the question of obtaining representation on the Medical Division. We have in the Division of Biology, of course, the botanists, with whom you have much in common, and in the Chemical Division there is a large relation between chemists and pharmacists.

It seems to me that you might get your group together and study out an organization plan by which you could work into the Council, because, as I have explained here this evening, it offers an opportunity for the American pharmacists to do something for themselves and for science. It is not an organization that will do something for us but one through which we are able to do something ourselves. The work of the Council, as a matter of fact, has been largely self-examination and study so that it might be found in what way the organization could most profitably operate, and we spent hours in discussing and formulating decisions on questions of various degrees of complexity, and yet have not proceeded far. It is a very difficult matter, as I say, to organize the scientific forces of the country and to get them working together. If we could get all the people together in one place as an army would assemble and have them organized, it would be very easy perhaps, but as it is, it is very difficult to get a consensus of opinion in the first place and then to get it into operation.

In your case I think it would be desirable for you to establish connection with the Council by degrees. Soon you would have a representation of your own on the Council—that would come about naturally. The present organization is highly flexible and in no way fixed. It is responsive to the desires and wishes of our scientific organization combined or divided, just as is necessary or desirable. You need not in any wise fear that you are excluded from the organization of the Council or that you will have to "break into it in any way." It will only be necessary for you, as I see it, to have your plans well worked out and matured and to remember that the Council is a research organization and that it is designed for that one purpose—to encourage and extend the scientific research work in this country.

### PHARMACEUTICAL RESEARCH.\*

BY JOHN URI LLOYD.

We have listened with increasing interest to the outline of the Research Committee's systematic plans, so graphically presented by Dr. C. E. McClung. Would that we might all live to enjoy the consummation of the ideals expressed, forecasting as they do great achievements in a field that is practically limitless. When I found my name on the evening's program, as one appointed to discuss the subject "Research," I accepted that it meant, for my hearers, a rather prosaic evening devoted to details, but our friend's remarks have given me so inspiring an opportunity that I am led to venture into the realms of speculative thought whose outreaches are pleasurable to myself, and I hope will not be tiresome to my hearers.

Fifty years ago, when I was an apprentice in a drug store, a copy of a New York magazine came into my hands that came very near discouraging me from attempting the study of pharmacy. I found therein a statement, by a French chemist, to the effect (if memory serves me correctly) that if a book were printed with one million names on each page, one million pages in the book, and a million such books in one library, it would take a million libraries to hold the names of all the compounds that might, theoretically, be made from the known acids and the known alcohols. This statement was altogether hypothetical, and highly imaginative. There may have been an error of a few millions, but to a rustic boy, what would be the difference if there were a mistake in such a number? Calculating on such a basis is about the same as estimating star distances by sun distance units. When one considers a star that lies entangled in the milky way's infinity, what matters an error of a few million miles? When research is made of the millions of compounds cited by the French chemist, perhaps the astronomer's "milky way" has no speculative advantage. But I am only a humdrum pharmacist, as the world views such as ourselves; rights such as come to others, seem not in our sphere. Let us then, in propriety, come nearer home.

Very happily, Professor, have you told us that pharmacy is to be embraced in the program of your Research Committee. The question then is, have we, as pharmacists, ought to offer in the way of research opportunity? If so, what, and in what field does it lie?

In speaking of pharmacy, let me now use the word "art," since some may resist the application of the term "science" to pharmacy. And yet, I make bold to assert that this "art" of pharmacy embraces every "science" known, unless it be that of astronomy, and few will deny to us a share in the life that is the direct gift of the sunshine. This claim I presume to make, not altogether by reason of the modern conquests of pharmacy, but by historic right. Very remote must lie the field of human activity that held no pharmacist. Chemistry is an underlying

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