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THE NATIONAL ACADEMY OF SCIENCES[1]

ADDRESS OF THE PRESIDENT[2]

THE academy has adhered very consistently since its incorporation to the principle that the primary consideration for membership is convincing evidence, by scholarly character and productiveness, of devotion to the fundamental principles of science and the scientific way of knowledge, which are the sources of the discoveries and inventions that have transformed the social and economic conditions of modern life. There is no danger that we should depart from these principles. But it should be widely known that we fully recognize the social, economic and national responsibilities that rest upon us, and that we are making every effort to discharge these responsibilities. The academy occupies a very special position of responsibility in the relations between science and public affairs.

The academy itself is a small body compared with the great body of professional scientific men in the universities and colleges, in the schools of technology and medicine, in the engineering profession and in medicine, in the research institutes, in government service and in the industrial research laboratories of the country. The academy took a great step forward in the way of wider representation when it organized the National Research Council in 1916 at the request of President Wilson. This body is defined legally as an agency of the academy, but it is much more than that in practice: it is a sister body, possessing a large measure of independence, with which the academy cooperates harmoniously and whole-heartedly in the carrying out of our public relations.

We are bound together most closely not only in administrative ways, but also in spirit and purpose. The overlapping membership is numerous, but the National Research Council has much greater latitude than the

[1] Meeting in Washington, D. C., April 24, 25 and 26, 1939.

[2] Given at the annual dinner for the presentation of medals, April 25.

academy in the selection of members, all of whom receive their formal appointments from the academy. Through the National Research Council we maintain close relations with the national scientific societies, the members of which in their several degrees represent the institutions and professions to which the great body of scientific men are attached. The influence of the academy reaches out into all the country.

The Government of the United States recognized the significance of science to society long before our industrialists. You will find this foreshadowed in the words and acts of Washington and Jefferson, and in the early establishment of research in the scientific bureaus of the government. The incorporation of this academy in 1863 was, indeed, not possible until much progress had been made in this direction. But in the early years of my apprenticeship in the last decade of the nineteenth century, science and industry were hardly yet on speaking terms. Certain significant exceptions might be cited, but I am speaking broadly.

From the state of being largely ignored as a social and economic factor, science has in my own lifetime reached the condition of credit for complete transformation of the social and economic conditions of modern life, and this arouses expectations of new discoveries that will quicken old and create new industries, that will protect us in time of war, that will improve the health of the people and its innate qualities, and that will enable governments better to discharge their almost infinitely complex responsibilities.

It is unthinkable that the National Academy of Sciences should not respond to the utmost of its capacities. Created as it was to advise the agencies of the Federal Government on any subject of "science or art," and pledged as each member is to render his services to the government without any compensation whatever, the present grave time calls for a renewed dedication to the service of our country. Our government expects and is entitled to this service from us by the very articles of incorporation.

The intention of the creators of the academy was not, however, to establish another bureau under government control—either in the minds of the government or of the founders themselves—it was, on the contrary, to establish a free and independent body, with complete control over election to membership, that could be relied upon to advise without bias or fear. For this reason the no-compensation clause, to which I have alluded, was introduced; and for this reason the academy itself has neither sought nor received financial support from the government.

Four years ago my predecessor in office, the deeply lamented William Wallace Campbell, reminded us of the similarly disinterested position of the Royal Society of London, and quoted the statement in the annual address of the president of the Royal Society in 1904, Sir William Huggins:

> . . . The Royal Society . . . asks for no endowment from the state, for it could not tolerate the control from without which follows the acceptance of public money, nor permit of that interference with its internal affairs which, as is seen in some foreign academies, is associated with state endowment.

The functions of the National Academy in relation to the government were much more fully defined in President Wilson's executive order of May 11, 1918, in which he requested the National Academy of Sciences to perpetuate the National Research Council. Every member of the academy should occasionally read this executive order, prepared with the advice of some of our members, for it is the principal outstanding historical event, so far as the academy is concerned, since its foundation. The most important extension of the charter is undoubtedly the direction to the National Research Council "to develop effective means of utilizing the scientific and technical resources of the country" for stimulation of scientific research and its applications in engineering, agriculture, medicine and industry, for strengthening of the national defense and for cooperation in the interests of the public welfare in general.

I speak of these things as functions of the academy because of my strong conviction that the academy and the council are one and indivisible. Perhaps this conviction was quickened by my unique experience of holding simultaneously, for the space of one year, both the offices of president of the academy and chairman of the National Research Council; but in the three years ensuing this conviction gained strength.

Now these responsibilities are rather overwhelming, and it is no wonder if at times, since the enthusiasm of the Great War, our footsteps may have seemed to falter. The discharge of them requires the closest cooperation between academy and council. We must be constantly watching the tide and be prepared to take it at its flood.

There is not time to enumerate many accomplishments or specific activities. These are described, if not vivified, in the grave and gray pages of reports; and the prepared, intelligent and sympathetic mind can learn much from them. Would that some of our critics had so profited!

A considerable number of important special projects and studies of the National Research Council are quite adequately supported by special funds generously provided by foundations and others. But support of the general strategy and overhead expense involved in the promotion of the scientific, industrial and social, governmental and public interests, both of the academy and the council, is woefully inadequate and quite incommensurate with the opportunities and responsibili-

ties. The possibilities for service can not be fully realized until the free income of the academy and council is greatly increased.

I shall not dwell upon the activities of the National Research Council, in the attempts to raise the standards of the scientific personnel of the country through post-doctrate fellowships and in numerous other ways; nor on the rapidly developing relations with industrial and medical research; nor yet on the several continuing projects of stimulation of research or of aids to learning in special fields supported by various foundations; nor even on the several research organizations fostered and in some cases set up by aid of the National Research Council. I shall leave these reviews and others to the chairman of the National Research Council at the appropriate time.

But I would like to say something about the government relations of the academy and council. Here I wish to draw a distinction. On the one hand there are day-by-day relations, formal and informal, which are sustained by the chairman of the council, by the executive secretaries of the academy and the council, and as opportunity offers, by members of both, either in official or unofficial capacities. On the other hand, there are formal reports prepared at the request of government agencies by committees appointed by the president of the academy. Somewhere in between comes our relationship with the National Resources Committee of the government through its science committee, on which we have three representatives.

I do not exaggerate when I say that our success in carrying out the obligations of the charter of the academy depends upon what I have called day-by-day relations with government agencies. For it is necessary that we should know them, and that they should know us. In no other way can our relations succeed. They should know that we are here as friendly fellow-citizens with some scientific information, and that if there is occasional criticism on our part it is that of friends with a double stake in the problems with which they deal. They should also know that we are in a position to aid them in utilizing the scientific resources of the country. In this process of growth of mutual understanding we rely especially on those members of the academy and of the council who are also in the direct service of the government.

The rendering of formal reports is occasional. Into these reports should always go the best opinion of the academy. They should be judicial and authoritative. It is such reports that the Congress and the founders of the academy had in mind when framing the act of incorporation. The academy must therefore decline to attempt reports in fields in which it is not fully competent.

In the organization of the academy and council, the Government Relations and Science Advisory Committee, of which the president of the academy is chairman *ex officio,* has special oversight of such reports, which are prepared by subcommittees appointed by the chairman. Such subcommittees are appointed on formal request by the appropriate officers of the government, and the agency concerned provides by contract for payment of out-of-pocket expenses of members of the subcommittees and for any necessary expenses of investigation; but the members of the subcommittees receive no compensation whatever for their services.

At the present time six such subcommittees are in operation, two of these being retained as advisory committees to the agencies in question. Three other advisory committees, not concerned in the preparation of formal reports, have also been appointed as subcommittees of the Government Relations and Science Advisory Committee. It is perhaps needless to say that the proceedings of such committees are held confidential, by the academy, but may be released by the government.

The National Resources Committee, engaged in the preparation of plans for the long-time utilization of national resources, reports its findings to the President and the Congress with recommendations. Such planning involves land, water, public works, industry, energy sources and population. In each of these divisions scientific considerations are of primary importance. A little more than four years ago, the chairman of this committee, the Honorable Harold L. Ickes, requested the president of the academy to appoint three of its members to a science committee of the National Resources Committee, which includes also three members representing the social sciences and three representing education. This was accordingly done, and the academy has been so represented ever since. The work of this committee has been of growing importance, and our own relations to the government have profited increasingly through it. The academy and the council highly value this new avenue of relations with government agencies.

FRANK R. LILLIE

ABSTRACTS OF PAPERS

Ultra-violet solar intensities and ozone distribution in the upper atmosphere: W. W. COBLENTZ and R. STAIR. In a preliminary report (SCIENCE, 87: 426, 1938) a summary was given of the progress made in measuring the ultra-violet solar intensity and thereby determining the vertical distribution of atmospheric ozone at various heights above the earth's surface, by means of a photoelectric ultra-violet intensity meter and auxiliary radio-transmitting apparatus, transported aloft by means of unmanned balloons. As a matter of record the following report is given of the results obtained, during the summer of 1938, with the aid of a grant from the Joseph Henry Fund, in cooperation with the National Bureau of Standards. Two kinds