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SCIENCE

Development of a Science Policy

Steps are needed to center full responsibility for government programs in the government itself.

Wallace R. Brode

"The liberal spirit which animates both Congress and the executive departments in their dealings with scientific affairs is very apt to lead them into the support of scientific enterprises without any sufficient consideration of the conditions of success and of efficient and economical administration; and a careful consideration of each proposed undertaking by a committee of experts is what is wanted to insure the adoption of the best methods."

These words appeared in an editorial in *Science* published 25 April 1884. The magazine *Science* was then only three years old, the American Association for the Advancement of Science was 36 years old, and there were only four or five government agencies active in science. What prompted this editorial of 75 years ago were the lively discussions on the need for a Department of Science in the government. Then, as now, the scientists as well as other government officials were divided in opinion. In 1884 Congress appointed a commission, known as the Allison Commission, to consider the creation of a Department of Science. The President of the National Academy of Sciences, O. C. Marsh (a former AAAS president), was asked to name members of the academy to serve on a committee to assist the Allison Commission. Among the members named were two distinguished scientists, Simon Newcomb and Cyrus Comstock. This committee was to survey and study the procedure of handling science in other countries and to recommend methods of coordinating the scientific areas. Simon Newcomb had served as president of the American Association for the Advancement of Science seven years earlier, in 1877, and was one of the Navy's most illustrious scientists. General Cyrus Comstock was an equally distinguished academician who served in the Army. However, the Secretaries of the Army and Navy both objected to a government scientist from their agencies serving on a National Academy of Sciences committee which was to advise the government.

One of the most outspoken in favor of a Department of Science was Major John Wesley Powell, a vigorous and colorful government scientist, who was chief of the Geological Survey, a nonmilitary establishment. Powell appeared on 16 occasions before the congressional committee. He commented on the elimination of Newcomb and Comstock from the academy committee and noted that the "military officer plans and commands; the civil officer hears, weighs and decides," and that "the military secretaries did not desire to have their subordinates deliberate on questions of policy affecting the conduct of the secretaries themselves." Powell, however, felt this suppression was justified in the military circles but would not have been justified in a civilian area.

The National Academy of Sciences committee expressed the feeling "that the time is near when the country will demand the institution of a branch of the executive government devoted especially to the direction and control of all of the purely scientific work of the government." However, if establishment of a department could not be effected, they felt that a coordinating scientific commission would be in order. Neither a Department of Science nor a Science Commission was established, due to various factors, including political changes in a new Congress.

Powell supported a Department of Science, although he favored some modification of the proposals of the Allison Commission. Powell was elected president of the American Association for the Advancement of Science in 1888, and I had thought that his presidential address before the association in 1889 might add some comment, in retrospect, to his testimony of four years earlier on a Department of Science. However, Powell's presidential address, published in the American Association for the Advancement of Science's proceedings, was a scholarly ethnological discussion on "Evolution of music from dance to symphony"—a subject on which he, as founder of the Bureau of American Ethnology and a student of American Indian culture, was most competent to address this association.

The very fact that the organizational issues being considered 75 years ago are basically identical to those of today raises this fundamental question: Has science changed in relative importance over the period of years since the founding of our country? Jefferson, as Secretary of State in our first cabinet, was in a sense also Secretary of Science because he handled such areas as patents, decimal coinage, and our standards of length and weight. Each major scientific or technological development has in its period of history created startling and revolutionary changes in the daily pattern of life. The telegraph as compared to the pony dispatch probably represented a more radical advance than did the telephone over the telegraph, the

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radio over the telephone, or television over the radio. The electric light had just been introduced in 1884, and there appeared in the literature pronouncements about the "impact of science" which are as current as if made today.

Although it would appear that problems which existed earlier are still with us today, they are actually compounded. Whereas Thomas Henry, Asa Grey, Wolcott Gibbs, and others in the past produced their discoveries and theories as individuals, many of today's advances represent the work of teams, whole laboratories, and industries. This complexity in the scope and size of scientific operation will not remain static but will continue to increase dynamically.

Hence, the concern of the scientific community is justified. If one feels that present arrangements are unwieldy enough today, what will their state be in another 100 years?

Recent Developments in a National Science Program

The American Association for the Advancement of Science has led in exploring these problems through its Parliament of Science, its Basic Research Symposium, its regular meetings, its programs, and its publication *Science*. These have all helped to stimulate the consideration of our science policy. In the past two decades there have been a number of governmentally appointed boards, panels, and commissions, to evaluate the place of science in our nation and government. Nearly 15 years ago Vannevar Bush, as the coordinator of the nation's defense research, issued his famous treatise *Science, the Endless Frontier*. In 1946 the President of the United States created a President's Scientific Research Board, under the chairmanship of John R. Steelman, to study science and public policy; and in 1947 this board issued a four-volume work known as the Steelman Report, under the title *Science and Public Policy*. Six years ago the Commission on Government Reorganization, also known as the Hoover Commission, was concerned with our expanding government. In 1956, the President's Committee on Scientists and Engineers was created; in 1957 the President's Science Advisory Committee was established, and upon the recommendation of this body in 1959 the Federal Council for Science and Technology came into existence.

All of these groups have devoted considerable time and energy to various phases of government operation and the role of science. The National Science Foundation is a direct result of recommendations made by Bush and the Steelman Report. As a result of the Hoover Commission studies there evolved the Department of Health, Education, and Welfare, which encompasses major social and health agencies, but whose ultimate formation was not accomplished without considerable controversy and discussion.

Priorities—Imbalance

A recent editorial in one of our nation's leading papers notes that chairman McCone of the Atomic Energy Commission "is convinced that the United States—if it is not to become technologically and economically inferior to the U.S.S.R.—must work out methods of marshalling its scientific and technical talents for concentrated *top priority* work on projects of overriding significance." McCone further proposed that this increased activity in a specific scientific field should be made "at the expense of projects of lesser importance." If one did not know the scientific subject matter of chairman McCone's agency, one might well ask, "Is this space, oceanography, undersea geology, meteorology, medicine, education, high-energy physics, atomic energy, food, materials, weather and smog control, or transportation?" Each of these areas has supporters who feel that programs varying from ten million to ten billion dollars a year are essential to scientific progress.

This *overriding* or *top-priority* attitude of some specialists is a reflection of the enthusiasm for one's own field of specialization. However, a crisis has been reached in this overlapping expansion and growth of our science programs, so that none of these major programs can be adequately supported except at the expense of the less glamorous areas of science, education, and culture, which are, nevertheless, essential to our basic welfare.

Why have we arrived at this state or crisis? The answer is *expediency*. The immediate conditions and circumstances existing at the time determine which programs are "top priority." Even when the stimulating conditions have been removed, the top-priority label is often maintained. Then another set of circumstances dictates the creation of another top-priority label assignment to another area of science.

Even though "atoms for peace" is slowly being transformed into "science for peace," there do exist separate areas of nuclear and atomic research which enjoy an elevation high above science in general. Many less well developed nations have devoted time and resources to nuclear and atomic programs rather than basic science. There are areas of the world where basic education, health, and agricultural training should predominate, but we find these countries building nuclear reactors by crude methods of hand labor. When we ask what is to be done with the reactors we are advised that they are training reactors, to train people to run more reactors.

The latest area of science which is capturing the minds and purse of our nation is space. There are a number of good contenders in the race for future top-priority assignments. Perhaps the next will be oceanography, weather, or materials research. We do favor advances in these areas of science; we need this progress, but this progress should not be effected through a corresponding reduction in the rate of advance for other equally important areas of science.

How can projects which are "overriding" and those which are of "lesser importance" be identified? Who is to make this allocation of relative effort? One of the most difficult tasks facing us is to achieve a long-range planning effort which would remove expediency as the sole controlling factor. A national science policy is needed for a wise and rational distribution of scientific activities, so that space, defense, education, atomic energy, oceanography, and medical research are not bidding against each other for limited available support. The growing demand for scientists in the face of a limited supply of scientists, materials, funds, and facilities requires major policy decisions as to the distribution of resources. These decisions should of course include the extent to which specialized agencies may recruit by scholarship, fellowship, and research support.

Every enthusiastic scientist with a dream for the future can envisage space ships at his command; areas of flashing lights and computing machines reading, translating, abstracting, and digesting the world's literature, even solving the problems punched into the machine; or reflecting radio telescopes a mile in diameter to enable him to communicate with other worlds. However, there must

be a limit, and not only must scientists realize that there should be a relative priority assigned to areas of science but there should also be recognition that scientific programs do not all have priorities that override economic, political, educational, and social developments.

With tongue in cheek, a past president of the American Association for the Advancement of Science, Warren Weaver, approached this problem of super-programs and priority assignments in a recent article in *Science* [**130**, 1390 (20 Nov. 1959)], in a clever satire on the "Report of the Special Committee." The "Weaver Report," along with Parkinson's Law, may provide the means for arriving at some solution to our problem, by taking a distorted view and working backwards toward a rational solution.

Current Research Support

We have seen a marked shift in the responsibility for the support of scientific research in the past 30 years. In the 1930's the government was supporting only about 15 percent of the nation's basic research, which was almost exclusively in its own laboratories. Today, the federal government is supporting about 85 percent of the nation's basic research, of which still only about 15 percent is in its own laboratories. This great growth, in both percentage and total amount, has been primarily in research support in industrial and educational contracts. Today our government's total budget is many times larger than the budget of the 1930's, and four-fifths of this budget is for defense activities and less than one-tenth, for normal governmental activities. The expenditure of 1 percent of the defense agencies' budget (and I am including the area of applications of atomic energy and space research as defense) in support of research means about $500 million a year, which is about 85 percent of the nation's program in research. This means essentially that our scientific research program is directed and guided by these agencies.

It is certainly true that after World War II there was an emergency situation and that without the aid given our educational and research programs by government agencies concerned with defense and applied sciences we would be in a sorry mess, unless—and this is the great unknown—the pressure of the situation would have been sufficient to create a more logical civilian support to this civilian activity. It is generally agreed that the initial "bailing out" of universities by the opulent agencies required only a small portion of their total budgets and was a good thing in the immediate situation. Just how much this expedient delayed general support to science education, coordinated science programming, or a national science policy is unknown and may never be clearly recognized.

The Steelman Report recommended that the National Science Foundation should support basic research in governmental establishments as well as in universities, yet the pattern of today's grants is essentially to universities and does not combine what could be the government's broad interest and coordination of the entire national science program.

In many of the basic-science areas of the government, such as the National Bureau of Standards, the Weather Bureau, the Geological Survey, the Bureau of Mines and the Forest Products Laboratory, which are attached as appendages to major departments, personnel supported by direct appropriation are essentially at the prewar level of the 1930's. The growth of the bureaus needed to keep up with our expanded science program is almost entirely dependent, as have been our universities for support in research, on contracts from the large agencies concerned with applied sciences and defense. Another justification for the continuance of research support both in universities and in nondefense government laboratories by the major agencies concerned with defense and applied sciences has been that with multiple supporting agencies, contractors can shop for different sponsors. Since this research is only a minor function of the supporting agency and often is not directly related to its mission, less coordination might be expected than if all funds came from a single agency whose principal function was to support our national science and educational program.

In the establishment of the National Science Foundation many of us who followed the discussion of its formation felt that the nation's responsibilities in basic research would, to some extent, be absorbed from other government agencies concerned with applications who had assumed some of these responsibilities. To prevent a drastic movement of the support of basic research to the National Science Foundation, it was actually indicated that the various agencies concerned with applications should continue to support, in their own organizations, "basic research in areas which are closely related to their mission."

There was no intention of removing basic research from agencies and laboratories which require it in their developmental activity. In fact the thinking scientist has often been worried to find that there did not appear to be a sufficient guarantee of adequate interest and support of necessary basic research in the agency establishments concerned with applications.

Most of our technological agencies have special authorizations in their enabling acts permitting them to engage in basic research in support of the objectives of their mission. So far as I know there has been no question raised as to whether such research was proper. However, many technological agencies have used such a research authorization to justify their support of research programs in all areas of science rather than in those areas which would appear to be directly concerned with their proper mission. Even the National Science Foundation, which has a rather broad mission concept, is aware that certain phases of science, such as medicine and agriculture, are in the areas of responsibility of other government agencies.

Nearly all of the agencies concerned with applications have indicated that they feel a responsibility to help train the research workers of tomorrow through scholarship and research grants. If such agencies strongly felt a responsibility, they would show no reticence in providing such funds to the universities as university grants, or in transferring these funds to the National Science Foundation to augment a planned national program of general support. What is disturbing is an insistence by each agency that its granting office should be able to select and direct both the recipient and the subject of research so as to exercise a guiding hand in our educational and research institutions. These amounts are not small, for they constitute much more than half of the total support to basic research in this country.

The problem which concerns us is that Army, Navy, Air Force, and space and atomic energy agencies have had to assume responsibility for contracting for this very extensive amount of basic research in universities, foundations, and government laboratories both here and abroad in all phases of science. While most of these supported groups and many scientists in this country do not

question the source of the "money in the collection plate," it has become more apparent to me in dealing with foreign science programs that there is hesitancy abroad on the part of scientists or universities at becoming involved in programs supported by a foreign military agency. This is especially so where the country is essentially neutral or where the program is not a part of a mutual defense act in which the scientist's own country is participating and to which the proposed program is attached.

With the great increase in recent years in the support of basic research by public agencies and foundations and the predicted doubling of research in the next ten years, there is reason to feel that a more orderly way of funding might be evolved than reliance on a multiplicity of sponsors. The urgency of the need for a revision of our program methods becomes greater as the size of programs increases so as to involve large sums of money, large numbers of individuals, and many research facilities. The pressures for priority action on massive programs, such as those concerned with space ships, new sources of energy, or weather control, often develop in the nonscientific political or economic areas and work their way towards the university, industrial, and government research worker.

Obligation To Continue Support

Many of us are concerned, as was Eliza Doolittle in Shaw's *Pygmalion* (and in *My Fair Lady*), who plaintively asked "What's to become of me?" when, after being raised to a level of competence and ability, she was threatened with the possibility of being cut off from her subsidized support and faced the prospect of being heaved out on the streets and having to shift for herself again.

The government has a responsibility, which will certainly grow in size and scope, to support a major share of the nation's research and applied-science programs. This responsibility in the area of advanced scientific education and basic research in universities, institutes, and government laboratories must be fully met if we are to maintain a technological leadership in the world.

There should be a revision and realignment of our support so as to provide more direct and less controlling support to universities, and greater direct support to government basic-science programs in the government's own laboratories. Serious consideration should be given to the reduction or elimination of "convenience" or synthetic scientific agencies which, while operating as nongovernment laboratories or institutions, are doing almost exclusively governmental work with government funds. These laboratories should be made bona fide government laboratories, and they should be so directed and set up as to permit the government to do its own essential scientific work under working conditions which are most conducive to efficient and effective operation.

I feel that the government does have a responsibility to continue to support science, just as it has a responsibility for health, agriculture, and defense. There must, however, be some instrumentality with a considerable degree of control, which can decide when to support, when to taper off, or when to terminate various research programs—and such responsibility must eventually center in a coordinating establishment such as a Department of Science.

Government Scientists

If we are to maintain in the government high-level policy and research positions for scientists we must provide compatible employment and a challenge to their capabilities in the responsibilities assigned them. It is difficult to attract or hold good scientists if there is no future level of administrative or research responsibility which they can expect to reach. Much of the government funds for applied research for the government is used to maintain non-civil-service laboratories or organizations such as Los Alamos, ARPIA-IDA, Lincoln, Brookhaven, Oak Ridge, the Applied Physics Laboratory, and many industrial laboratories. These quasigovernmental laboratories provide higher salaries and better working conditions than are provided scientists in the government and—perhaps most important to the scientist—provide high-level, polity-type positions of responsibility, and the employees are treated as nongovernmental scientists in dealing with the government. It would seem that a number of these contract operations in science and technology should be reexamined to determine whether there should be an improvement in the status of the government-employed scientist and direct absorption of much of this work in a Department of Science or other coordinating science structure in our government.

One interesting recommendation of the Steelman Report was that the board of the National Science Foundation should be composed of "distinguished scientists and educators to be drawn one-half from the Government and one-half from the outside." Actually the board includes no government scientists but is made up exclusively of university and industrial leaders, with university personnel predominating. In selecting personnel to run government departments, bureaus, or offices it is generally the procedure to try to find someone to bring in from the outside. Usually such a person is on leave of absence from his industry or university for one or two years. Seldom is the appointment of a career civil servant seriously considered, even though there are in the government career civil servants who may be recognized in other nations as world authorities and leaders in the field.

There should be established a policy whereby top management is not maintained on a rotational system by persons who are not directly associated with government operations. It is certainly true that many a highly respected and competent university professor, lawyer, or businessman has at considerable sacrifice of time and money, and often of prestige, agreed to come to Washington for a one- or two-year period to pitch in and help run the government. Nevertheless, the government should develop within its own establishment sufficient capability to operate its agencies, and our policy decisions, whether they be in science, taxation, or welfare, should not be made without guidance from personnel experienced in governmental operations.

Determination of Future Policy in Science

The problems to be faced are these: (i) determination of the direction in which science will advance and of the areas in which continuing or new programs are to be supported; (ii) the emphasis and relative priorities to be placed on scientific programs, including not only the "top-priority" programs but also the minor programs which need to be kept alive and operating on a modest scale; (iii) the administration, financing, evaluation, and support of our science programs within the government; and (iv) the distribution of responsibility for the carrying out of scientific programs between government laboratories and university, private, industrial, domestic,

and foreign (intergovernment, government, and private) facilities.

The directions in which science should be encouraged to advance will in part be spontaneously determined for us by the inquisitive research worker who has been given freedom to probe. Essentially this is exploratory research and should be supported by institutions, so that research workers may spend a reasonable portion of their time in exploration. In addition to this limited area of free research there is our major area of programed research, for which there should be some over-all plan. Such a plan must establish the relative priorities or emphasis and the rates at which certain programs should be pursued.

Our problem today is that we have reached a saturation point with respect to available personnel. Hence, further expansion or support in many fields must of necessity require reduction of the active available material in other science programs. Such a disturbance in our present unstable equilibrium of distribution of effort is particularly felt when massive new programs are initiated, such as new billion-dollar efforts in space, oceanography, or health.

The Hoover Commission noted that our government is expanding to such an extent that the executive branch has 74 agencies "which divide responsibility and which are too great in number for effective direction from the top." The commission recommended that certain of these should be "grouped by related function under the heads of departments." They indicated "in many cases several agencies each have a small share in carrying out a single major policy, which ought to be the responsibility of one department." In summary they concluded that the government must "create a more orderly grouping of the functions of government into major departments and agencies under the President."

The Steelman Report in discussing the creation and operation of a proposed National Science Foundation suggested that the Foundation "should be located within the Executive Office of the President until such time as other federal programs in support of higher education are established. At such time, consideration should be given to grouping all such activities, including the National Science Foundation, in a single agency." The National Science Foundation, which was subsequently established, has a more scientific than educational mission, and with the establishment of other new science agencies, such as the space agency, it would appear that the Steelman recommendation might well be applied in principle toward the creation of a Department of Science.

Coordination of Science in the Government

There is little if any opposition to the broad concept that as scientific or any other activity grows in size and complexity and begins to be a major consumer of personnel, funds, and facilities in our economy and culture, some consideration should be given to increasing efficiency in the utilization of our limited resources through suitable coordination and planning.

The President's Science Advisory Committee, a group of nongovernmental scientists, in viewing from outside the government the problem of science in government, suggested that there should be created some instrumentality to promote closer cooperation among federal agencies in planning and managing their program in science and technology. They recommended the establishment of a Federal Council for Science and Technology, and the President issued an executive order accordingly, in March 1959. This council is an inside-the-government group consisting of policy members of departments or agencies concerned with science. The representatives, however, need not be scientists, and as the council is presently constituted, many are not scientists.

It would seem reasonable that the Congress should be able to seek advice and counsel from a coordinated science leadership in the government. Early this year the chairman of the congressional committee held hearings on a possible Department of Science and sought the appearance as a witness, for advice and comment, of the chairman of the newly created Federal Council for Science and Technology. The council chairman declined to appear, on the grounds that he was a privileged member of the President's staff, yet as head of the Federal Council for Science and Technology he was responsible for the organization which was charged with making recommendations for the creation of effective means of promoting a more efficient, coordinated science program in the government. It was my own opinion, which I expressed when, as president of the American Association for the Advancement of Science, I was asked to appear before the same congressional committee, that a strong and responsive Federal Council for Science and Technology might well evolve into a Department of Science.

The inability of the Congress to draw on the advice of the existing Federal Council for Science and Technology is in itself an indication of the need to separate our science coordination direction from the President's own office and Science Adviser so that the coordinated leadership in science in the government may speak with the authority of the group it represents rather than only through the President. I feel that the President should continue to have a strong science adviser, however, in the presentation of a science program for the government. The leader of the program should be able, like the heads of other agencies, committees, departments, or commissions, to speak for his agencies before the Congress, and also to report the findings and recommendations of those agencies to the President. It would seem that in the organization of science and our governmental science policy, as in the areas of labor, commerce, the military, health, education, and agriculture, it should be possible for the planning and organizing committees of Congress to have reasonable access to the agency in question for advice and assistance.

The President's Science Advisory Committee considered the suggestion of a Department of Science as a proposed solution to the problem of coordinating the nation's science programs but defined a Department of Science as a department which would bring together *"all* of the government's numerous scientific and technological operations," including the scientific phases of defense, agriculture, and health which were directly related to the missions of the agencies with responsibility in these areas, and pointed out that such operations "could not be satisfactorily administered by a department far removed from the problems that are to be solved." This is a synthetic defense in that elimination of research or development work pertinent and essential to the proper missions of these agencies was not proposed or recommended by the promoters of the legislation actually before Congress. The proposed legislation for a Department of Science was somewhat nebulous, but its main purpose was to stimulate discussion, and its originators recognized that it did not present a Department of Science concept that would be fully acceptable to all.

I consider as not of significance the

arguments presented in the congressional hearings in which those who opposed a coordinated science program maintained that such a program would place too much centralization of authority in a single agency and establish too much government control. Neither argument is tenable if proper administration is provided and safeguarded.

A corrupt and mismanaged program would be bad, but to argue against any coordination on the grounds that it *could* be bad is just not logical. We should favor a governmentally supported program and at the same time incorporate into such a coordinated program the essential safeguards used in our local, state, national, and international institutions, both governmental and private.

Belgium, France, South Africa, and England have created cabinet or semicabinet posts for science departments. England has already indicated the nature of agencies to be absorbed into such a collation. These include space, atomic energy, health, research grants, and specialized science agencies such as standards, weather, patents, and science information. In his first press conference Lord Hailsham, Lord Privy Seal and the new Minister for Science in the British Cabinet, pointed out that "whether or not there is a need for a Minister or Ministry [in science] . . . there is a need for a policy in science and that policy cannot be a product of government thinking alone." Lord Hailsham emphasized that his Advisory Council on Science Policy "provides one of the keys to the present situation composed as it is of a unique connexion of Government and non-Government scientists. . . ."

Pioneering in the creation of a Department of Science in a government took place in this country about 100 years ago, under somewhat unusual circumstances. In the process of reviewing material for this presentation I became interested in how many presidents of the American Association for the Advancement of Science had been government scientists for a considerable portion of their careers. I found that about 30 out of the 112 had been government scientists. One of the former presidents of the American Association for the Advancement of Science was John L. LeConte, in 1874. In looking up his background I was intrigued to find that he had two cousins, Joseph LeConte and John LeConte, who had served as members of the Science Department of the Jefferson Davis government during the Civil War. Joseph LeConte also became president of the American Association for the Advancement of Science in 1892.

If we accept the concept that we need a national science policy to guide our scientific effort, and if, as a result of suitable commission and congressional action, formation of a Department of Science is proposed, we should be certain that it is in fact as well as in name an operating department. It should not be a superstructure imposed on existing organizations, but it should represent an honest and real effort to mesh the scientific interests and objectives of our government in the fullest possible utilization of resources. Thus, a Department of Science, while not removing from agencies such as Defense and Agriculture, concerned with applications, the research programs specific to their missions, should include all major segments of science not specifically pertinent to those missions. It should have separate bureaus or institutes with suitable directors of distinction to deal with space, atomic energy, medicine, weather, patents, science information, physical science, geology, and other recognized areas of importance. Each director should be aided by an advisory panel of experts in his area, drawn from academic, industrial and government sources.

To provide the Department of Science administrative head with broad and helpful advice it would seem reasonable to create an advisory council, which might be designated a National Science Council. Such an advisory group should not be exclusively academic but should include representation from government, science, and industry as well. Its principal responsibility would be to provide the Science Department administrative head with broad advice which might be helpful in arriving at decisions on the extent and character of support which the government should provide both to science programs in the government and, through contracts or grants-in-aid, to industry and universities—in short, the implementation of a National Science Policy.

Commission To Study Problem

These comments of mine on the creation of a Department of Science and a National Science Council have been postulations based on the needs that exist to coordinate governmental science, to create a National Science Policy, and to establish a liaison between governmental, academic, and industrial science (*1*). Before firm and thorough recommendations can be made, a commission should be established to study all of these questions very seriously. Such a commission should include representatives of government and of the academic and industrial community in both scientific and nonscientific areas. If the United States is to achieve a balance not just in its budget but also in its scientific programs, both immediate and long-range, there has to be a thoughtful and penetrating analysis of the problem. There must be the maturity of judgment and the courage of action required to change existing institutions, procedures, or philosophies where it is necessary. Where necessary there must be a facing of the problem and recommendation of essential drastic action, so as to avoid continuance of methods or actions which merely postpone the day when action must be taken.

Conclusion

The retiring presidential address before the American Association for the Advancement of Science is a personal presentation of my own ideas and is not intended to present the opinion of the association. Last year's speaker, Lawrence H. Snyder, presented a thesis on genetical concepts which were those of the speaker on that occasion. When a university professor presents a paper before this association it is taken for granted that his opinions are his own and not those of his university. In my presentation I have pressed for a more academic status for the government scientist, with opportunity to present for discussion and consideration before his fellow scientists his own concepts pertinent to science. I realize that there are many, including some members of the association's board of directors, who do not fully support or entirely share some of the ideas contained in my presentation.

In conclusion I would urge that some form of commission or study group should be established to give careful consideration to the problem of organization of science and science policy in the academic, industrial, and governmental areas of the nation, and that in this study serious consideration should be given to the following concepts.

1) There should be a regrouping of some of the government's scientific agencies or activities: either a Depart-

ment of Science, a National Science Institute, or some other coordinated structure. A well-developed coordination must be established between the regrouped combination and those scientific agencies which remain separate, so as to insure an efficient and comprehensive National Science Program.

2) There should be a realignment of the distribution methods and responsibility for support of basic research in our educational institutions, with a movement toward university grants, administered largely by a department concerned with basic research, rather than by agencies concerned with applications. This may well need to be coordinated with the growing problem of support for our advanced-education program in all areas.

3) There should be some separation of governmentally sponsored, major research institutions from our educational and industrial system, especially of those institutions which are essentially concerned with applied science. There should be a greater acceptance of the idea of operation of such institutions under an improved, directly governmental administration.

4) The liaison of scientists in government with scientists in the academic field and in industry should be represented by a National Science Council in such a manner as to be compatible with the maintenance of our broad culture and balanced development.

Note

1. The opinions presented in this article are not intended to reflect the opinions of either the National Bureau of Standards (Department of Commerce), with which I was previously affiliated, or of the Department of State.

How Our Air Force Supports Basic Research in Europe

This unusual program of military support for open research abroad has won widespread approval.

Howard J. Lewis

A visitor to the European Office of the U.S. Air Research and Development Command (EOARDC), a unit of the U.S. Air Force that occupies suites on the top three floors of the Shell Building in Brussels, Belgium, is immediately struck by the absence of three powerful military symbols: the uniform, the armed guard at the gate, and the visitor's register.

When questioned recently about this apparent anomaly, Col. Nathan L. Krisberg, commander of the European Office, replied: "It is not our intention to disguise the essentially military nature of this enterprise, but we do want to emphasize to visiting European scientists that our mission can be accomplished only through the open support of open research."

Now in its eighth year of operation, EOARDC is administering 306 research contracts, totaling some $6,591,478, with scientists in universities, research institutes, and industrial organizations in 16 countries of Western Europe and the Middle East. In the course of its development, it has worked out a procurement system which seems, on the basis of interviews with some of its contractors, to be regarded as both strict in its demands and wise in its understanding.

The European Office is, in the words of its statement of mission, "established to procure in Free Europe research and development in support of the mission of the Air Force and provide a scientific liaison fostering mutually beneficial relations between the United States and European scientific communities."

The mission of the parent ARDC is to support the conduct of basic research on behalf of the Air Force, to develop new and improved devices, processes, and techniques, and to maintain qualitative superiority of materiel. From its headquarters at Andrews Air Force Base, a few miles across the Maryland border from Washington, D.C., ARDC divides its various responsibilities among ten research centers throughout the United States, which perform laboratory and contract research, development, and testing aimed at the improvement of vehicles, weapons, and personnel training. To tap the additional and often unique scientific resources available in Western Europe, ARDC established its European Office in 1952.

The generous allocation of support to the EOARDC program is positive evidence of its success in contributing to the military mission of the U.S. Air Force. But even more significant may be the contribution of the European Office to the cause of world peace, for it has demonstrated that an intelligently administered program of international support for scientific research weaves a sturdy fabric of understanding among nations that cannot be purchased with dollars alone and can serve as a template for long-overdue civilian enterprise in this direction.

Proposals Evaluated in U.S.

European investigators in all fields of the natural sciences are urged to submit proposals to the Brussels office for the support of their research. They are promised freedom to publish results of their work in the open literature and, indeed, are urged to publish. Incoming research proposals are screened in Brussels by a crew of Air Force scientists, all experienced in laboratory or bench work, and approximately 75 percent of the proposals are routed to one or more ARDC laboratories in the United States for evaluation. If an ARDC laboratory wishes the proposed research to receive support, it must provide the funds out of its own budget and authorize their transfer to EOARDC, where the final contract will be drawn up.

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