institution or of the university, the crippling effect of power politics sets in and jealousy develops. When we come to centralized governments, in most cases at least, officers are reluctant to give up even the tiniest amount of national sovereignty. The major success of experimental scientists has been in showing the world that one can take a rational approach toward natural phenomena and dispel nefarious superstitions and prejudices. It is the duty of today's scientists, when their influence within societies is increasing, to show by concrete examples that it is to the immediate advantage of the nation, financially as in other ways, to forget nationalistic attitudes. When the battle for the supranational or international support of scientific research has been won by the laboratory scientist, a major step also will have been taken toward the establishment of trust between nations.

References

1. P. Auger, *Minerva* **1**, 428 (1963).
2. E. Rabinowitch, *Bull. Atomic Scientists* **19**, 7 (1963).
3. J. J. Salomon, *Minerva* **2**, 411–434 (1964).
4. D. J. de Solla Price, *Little Science Big Science* (Columbia Univ. Press, New York, 1963), p. 119.
5. W. V. Consolazio, *Science* **133**, 1892 (1961).
6. V. K. McElheny, *ibid.* **145**, 690 (1964).
7. ———, *ibid.*, p. 908.
8. R. P. Grant, C. P. Huttrer, C. G. Metzner, *ibid.* **146**, 507 (1964).
9. V. K. McElheny, *ibid.* **147**, 280 (1965).
10. C. J. Bakker, *Bull. Atomic Scientists* **16**, 54 (1960).
11. A. King, *Daedalus* **93**, 434 (1964).
12. R. K. Appleyard, *Science* **147**, 556 (1965).

News and Comment

NSF: Friendly Reorganization Plan and Hearings Impending in House Indicate How the Agency Has Grown

Among the federal agencies created to help the United States cope with revolutionary changes in the postwar world, the National Science Foundation has operated on a considerably smaller budget and with less drama than, for example, the Atomic Energy Commission and the National Space and Aeronautics Administration in their public activities and the Central Intelligence Agency in its nonpublic ones. But NSF was born amidst great expectations, and now as it approaches its 15th fiscal year of full operation and is requesting a budget of more than half a billion dollars, with, for the first time, a seemingly fair chance of getting it, the Foundation is attracting an increased measure of attention and scrutiny.

President Johnson recently sent Congress a reorganization plan which would make two changes in the advisory and administrative apparatus of NSF in recognition of growth and change. And on 22 June the subcommittee on science, research, and development of the House Science and Astronautics Committee is scheduled to begin hearings designed to accomplish the first comprehensive review of NSF activities since the agency was established in 1950.

Broad-gage congressional hearings on agency operations and performance often are relatively unproductive, since committee members and their staff seldom have a detailed knowledge of agency operations, and such hearings not infrequently become a guided tour of the trees by agency officials without a view of the forest ever really being gained.

To avoid this, the science, research, and development subcommittee, which is chaired by Representative Emilio Q. Daddario (D–Conn.), is holding a preliminary series of briefing sessions with staff members who have been gathering information and will suggest fruitful lines of inquiry. Figuring prominently in these preparations is a report titled *The National Science Foundation: A General Review of Its First Fifteen Years** produced by the Science Policy Research Division of the Library of Congress' Legislative Reference Service (LRS). Prepared at the request of the committee, and turned out in a relatively brief time, the report is strong on facts and figures and sparing in its analyses of problems and in qualitative judgments. It does, however, raise policy issues that beset NSF and federal science in general, and does inject praise and blame, primarily by quoting from the official record. The report is particularly useful in putting the development of NSF in historical perspective, and the comprehensiveness of information on budget, personnel, and program development indicates that NSF cooperated cheerfully on the project.

In its early years, NSF was an agency with grandiose goals but relatively meager resources. The act which created the Foundation said it was being established "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." From the beginning, NSF devoted itself to efforts in three major areas—support of research, manpower development (science education), and improvement of scientific information services.

At the outset NSF was dwarfed as a patron of research—even of basic research—by such mission-oriented agencies as the Department of Defense and the Atomic Energy Commission. By the mid-1950's, however, the Foundation was playing a significant role through the support of graduate education and was making an original contribution with its early programs to improve science teaching and encourage science-curriculum revision.

The Foundation had also been given the responsibility of encouraging the formulation of a national science policy and of evaluating scientific research programs being carried on by other federal agencies. It is generally agreed that the Foundation fell short of its sponsors' hopes in the matter of policy making, evaluation, and coordination.

That NSF was least successful in these efforts was not surprising in an

* Available from the Committee on Science and Astronautics, House of Representatives, Washington, D.C.

infant agency with a small budget and no particularly strong friends in Congress. The demonstrated willingness of officials of big-budget agencies to employ any tactics, from passive resistance to power plays, when they feel cuts in their programs may result from "coordination" efforts, explains why NSF was in many cases reluctant or unable to act effectively in this sphere, despite prodding from the White House.

A series of actions designed to strengthen science planning and coordinating authority within the Executive can be traced clearly from the year of the first sputnik, 1957, when the post of science adviser to the President was established in the White House and the 17-man science advisory committee in the office of Defense Mobilization was converted into the President's Science Advisory Committee.

In 1959 the Federal Council for Science and Technology was formed from among senior policy-making officials in science-oriented agencies, to provide, as the report suggests, a "science cabinet."

In the second year of the Kennedy Administration an Office of Science and Technology was created in the Executive Office of the President, with the President's science adviser as director. The law establishing the OST specifically provided for the transfer of NSF's authority to develop national science policy to OST. While the baton was passed, the finish line is really still not in view in the effort to centralize policy making and program coordination.

The impression that the year of sputnik marked a kind of Rubicon for federal science is reinforced by a look at the record of growth of the NSF budget. Table 1, excerpted from a more detailed history of NSF appropriations in the LRS report, shows that the agency's annual budget did not exceed $15 million until 1956, then was more than doubled for fiscal year 1957 and boosted to $130 million for fiscal 1959.

The fact that NSF has led a relatively quiet life in its dealings with Congress has been due in part to the financial arrangements under which it has operated. Since 1953, NSF has been given funds under what is called a "continuing authorization," which permits Congress to appropriate "such sums as may be necessary to carry out the provisions of the Act." Under these circumstances NSF has not been subjected to the regular dual process of authorization and appropriation, involving two committees in each house of Congress. As a result, the Foundation's fate on Capitol Hill has been largely in the hands of the independent offices subcommittees of the House and Senate Appropriations committees. As Table 1 indicates, the Senate has been more inclined than the House to approve appropriations which approach sums requested by NSF. This, incidentally, conforms with a general congressional pattern in appropriations matters in recent years.

Table 1. National Science Foundation: History of appropriations, fiscal years 1951–66, in thousands of dollars.

Fiscal year	Budget request	House recommendation	Senate recommendation	Amount appropriated
1951	475	0	225	225
1952	14,000	300	6,300	3,500
1953	15,000	3,500	6,000	4,750
1954	15,000	5,724	10,000	8,000
1955	14,000	11,000	14,000	12,250
1956	20,000	12,250	20,000	16.000
1957	41,300	35,915	41,300	40,000
1958	65,000	40,000	40,000	40,000
	9,900	8,750	9,900	8,750
	2,400	0	2,400	1,000
1959	140,000	115,000	130,000	130,000
				2,000
	4,400	4,000	4,400	4,000
1960	160,300	143,273	160,300	152,773
1961	190,000	160,000	191,600	175,800
1962	275,000	250,000	276,500	263,250
1963	358,000	310,000	335,000	322,500
1964	589,000	323,200	373,200	353,200
1965	487,700	420,400	420,400	420,400
1966	530,000	480,000		

The active interest in NSF of the science, research, and development subcommittee of the House Science and Astronautics Committee, which has legislative jurisdiction over the Foundation, has been taken by some observers as a sign that NSF may in the future be subjected to the regular authorization process as well as to appropriations hearings. This could mean closer regular congressional scrutiny of agency programs and policies.

The law creating NSF gave the agency fairly wide latitude in initiating new programs and activities but was quite rigid in matters of structure and administration. The two-part reorganization plan sent by the President to Congress recently, with the encouragement of the Foundation, is intended to relieve pressure where this built-in rigidity has caused anomalies and difficulties as the Foundation expanded.

The original NSF act specified that each division of the Foundation should have a five-man advisory committee of nongovernmental experts. At the outset, the Foundation had three divisions and three committees, but five divisions have been added and the increase in the number of committees, by statutory requirement, has produced a cumbersome structure. The Presidential message noted that, "for example, three committees are now concerned with scientific personnel and education matters instead of the original one committee, even though one committee is all that is required to meet the Foundation's need in this area. The elimination of the various statutory divisional committees will simplify the structure of the Foundation and improve its administration."

The reorganization plan would also change the law to empower NSF director Leland J. Haworth to delegate functions vested in him by law or delegated to him by the National Science Board. In immediate terms it would remove any doubt about the legality of NSF deputy director John Wilson's right to sign grant applications, and it would clear the way for a more effective delegation of authority in the agency, which has been one of Haworth's aims since he took over the directorship 2 years ago.

Despite these strictures, NSF seems to have acquitted itself creditably in terms of the original concept of the agency as a guarantor of scientific progress. While there have been difficulties—notably with Project Mohole, when the Foundation changed its spots to act as an operating rather than a research-supporting agency (*Science*, 10, 17, 24 Jan. 1964), NSF has done nothing to incur the wrath of Congress.

Daddario has indicated that his subcommittee, in proceeding with hearings, is not setting out in a search for instances of mismanagement but, rather, is interested in finding out how well NSF has performed in meeting the large responsibilities imposed on it by Congress 15 years ago.

The subcommittee appears to have made a good start toward acquainting itself with agency programs, but it remains to be seen whether the members have the appetite and the ability to grapple seriously with the deep-seated policy problems which still afflict the Foundation.

NSF director Haworth himself cited a few of these problems in his own statement in the most recent annual report of the agency. He phrased them in the form of questions.

"Should the Foundation attempt to devise new or modified support programs rather than continuing to rely mainly on the project grant method?

"How can one be sure that the relative amounts of support being provided by NSF to the various fields of science are approximately correct?

"What changes, if any, should NSF make in its policies and procedures in response to the increasing concern over geographical concentration of Federal funds for research and development activities?"

These questions in one form or another were being asked when NSF was born, and, as Haworth points out, they are problems which NSF alone cannot solve. The experience of NSF in the last 15 years in fact indicates that these questions are likely to be hardy perennials.—JOHN WALSH

Environmental Sciences: Johnson Proposes New Agency Merging U.S. Research and Service Programs

A plan providing for the merger of two vintage science agencies of the Department of Commerce was submitted to Congress by President Johnson last month. The proposal calls for the consolidation of the Weather Bureau and the Coast and Geodetic Survey into a new agency to be known as the Environmental Science Services Administration. The agency would also include a subunit of the National Bureau of Standards, the Central Radio Propagation Laboratory at Boulder, Colorado. With these units, the President said in a message to Congress which accompanied the proposal, "the new Administration will . . . provide a single national focus for our efforts to describe, understand, and predict the state of the oceans, the state of the lower and upper atmosphere, and the size and shape of the earth."

The proposed reorganization appears to have grown chiefly out of a desire to begin rationalizing the government's sprawling environmental science research and service programs, and only secondarily to effect budgetary savings. "The organizational improvements," Johnson said, "will enhance our ability to develop an adequate warning system for the severe hazards of nature . . . [and] will permit us to provide better environmental information to vital segments of the Nation's economy . . . ." Referring to the effect of the new agency on research, Johnson said that the integration of "a number of allied scientific disciplines" would have several beneficial effects. It will, he said, "better enable us to look at man's physical environment as a scientific whole . . . facilitate the development of programs dealing with the physical environment . . . and enhance our capability to identify and solve important long-range scientific and technological problems" in this area. As a consequence, Johnson said, "the new Administration . . . will promote a fresh sense of scientific dedication, discovery, and challenge, which are essential if we are to attract scientists and engineers of creativity and talent to Federal employment in this field." He also pointed out that economies were likely to result both from the sharing of costly equipment and facilities, such as satellites, ships, and computers, and from the "more efficient utilization of existing administrative staffs."

The reorganization move appears to have two main sources. First, in most general terms, it reflects a desire for unification of federal science activities that has been growing (particularly among nonscientists in government) for some time. These sentiments find expression in the calls for a single federal Department of Science that circulate periodically, so far without much success. More specifically, the proposal seems to reflect a rising concern in Washington over the enormous dispersal throughout the government of meteorological and related activities alone. These activities—research and service, military and civilian—involve an annual budget of around $431.5 million and are carried on by at least 17 separate agencies. While both the degree of agency involvement and the nature of the programs vary substantially, a fair amount of duplication has developed, sometimes through bureaucratic happenstance, sometimes because of the military agencies' felt need for complete control over their own specialized weather collection and information systems. One such case, recently cited by the Science Policy Research Division of the Library of Congress in a report to the House Committee on Government Operations, involved a dispute between the Air Force, the Federal Aviation Agency, and the Weather Bureau "with respect to," as the House report genteelly put it, "jurisdiction and operation of certain air weather services."

Not only the tangle of programs but their rate of growth has been attracting attention: from 1959 to 1965 federal expenditures for research and development in the atmospheric sciences increased by 440 percent. In this situation, governmental scrutiny inevitably became more intense. The concern was made apparent in several ways. In 1959, the Eisenhower administration established, under the Federal Council for Science and Technology, an Interdepartmental Committee for Atmospheric Sciences, to review and attempt to evaluate the patchwork governmental operations.

Later, in 1963, the Bureau of the Budget issued a special circular which attempted to establish guidelines for a more unified federal system and clarify the roles and responsibilities of the several agencies. The Budget Bureau specifically reaffirmed "the central role of the Department of Commerce with respect to basic meteorological services" and encouraged the department to develop a comprehensive federal plan and become responsible for its implementation. Accordingly, the Office of Federal Coordinator for Meteorology was established, and the post was given to Robert M. White, chief of the Weather Bureau. White was given a certain amount of authority over programs of other agencies. But his role is essentially limited to coordinating weather services and research that are of a general nature; the specialized systems of the Navy or the Coast Guard, for example, are still beyond his jurisdiction.

While a total reorganization of federal activities in environmental sci-