The Air Force: Study Relates Troubled Relationship with Research

Science and the Air Force, an official history published by the Air Force, candidly tells the bizarre story of the 15-year struggle to establish and maintain a basic research program in the nation's most technologically dependent military service. Rarely, if ever, has a government agency set forth the details of lacerating internecine struggles so soon after the event. For students of the postwar relationship between science and government, the 175-page work (available for 70 cents from the Government Printing Office, Washington, D.C.) is a marvelous blow-by-blow chronicle of historically crucial events. For the flourishing industry of science-policy theorizing, it provides striking examples of the way in which theory and policy are often rendered irrelevent by day-to-day bureaucratic conflict and maneuver.

The author, Nick A. Komons, states in the preface that his object was to examine "the human and political aspect" of the Office of Scientific Research (OSR), the now $37-million-a-year extramural support agency which, as he describes it, has come to be "the door through which the Air Force makes daily contact with the scientific community and the frontiers of science." (Komons, who wrote the work in his capacity as an Air Force historian, is currently preparing a history of the supersonic transport program for the Federal Aviation Agency.) True to his design, Komons tells little about the substance of OSR's research programs, but tells a great deal about the astonishing degree of indifference and opposition that existed and endured within the Air Force in connection with efforts to interest that service in basic research. A prevalent notion is that, after World War II, the military services seduced the scientific community with lavish subsidies. But, on the basis of Komons' copiously documented account, it appears that while the Air Force was, by and large, uninterested in basic research, academic scientists were climbing all over it in efforts to get Air Force support for university science. A few generals, Komons relates, were responsive to them, notably the Air Force Chief of Staff, General H. Arnold, who, in 1944, set up the Air Force Scientific Advisory Group and staffed it with a civilian group headed by the great Theodore von Karman. Von Karman urged upon the Air Force "a constant and inquisitive attitude toward science," and recommended that the Air Force develop an in-house as well as extramural program for supporting basic research. Arnold was readily persuaded, but, as Komons describes, "his enthusiasm for the report was not translated into effective action." When the general retired in 1946, "his successors did not bring with them the same sense of urgency for scientific matters. Moreover, there was formidable resistance within the Air Staff to tampering with the old way of doing things. More than one member of the Air Staff favored leaving fundamental science to civilians."

When subsequent studies urged that the Air Force emulate the successful program of extramural research that the Navy was operating through the Office of Naval Research, the Air Force responded by doing precisely what the Navy had not done—in 1948 it set up an Office of Air Research under the authority of an organization that was primarily responsible for procurement, the Air Materiel Command (AMC). ONR was deliberately insulated from the quick-fix demands that almost inevitably afflict the research operations that are appended to procurement operations. But the newly established OAR was not even accorded the recognition of quick-fix pressures. Rather, it was simply ignored. Komons relates that "the threat of failure hung over the new office from the first. People were scarce, equipment was hard to come by, money was never forthcoming." Shortly after the office was established, its first chief was transferred to another assignment. He left "with a feeling that a miracle would be necessary in order to put research in the Air Force on a sound basis."

Despite its indifference to conducting or supporting basic research, the Air Force of the late 1940's apparently was willing to examine its policies in this area. In September 1949, still another study was forthcoming, this one headed by Louis Ridenour, dean of the graduate school of the University of Illinois. The Ridenour Report took the tack that the Air Force could best serve itself in basic science by giving money to academic science and leaving it alone. In Komons' description of the report, "The research contract itself should not even specify what was to be investigated, 'Except in terms proposed by the investigator.' Moreover, contracts should be awarded 'less with regard to the description of the project than with regard to the ability and promise of the principal investigator.'" Ridenour was, in effect, proposing an ONR-style operation, and once again the Air Force responded with an administrative shuffle. A new organization, the Air Research and Development Command (ARDC) was established in 1950, with a mandate to take over R & D from the Air Materiel Command. The shift, however, did not inspire any great confidence in proponents of an Air Force research program. Stuart Symington, who was then Secretary of the Air Force, wrote, "My apprehension is increased because . . . we are now going to take on those who don't want the Air Force to advance in the broad field of research and development." General Donald L. Putt, one of the top officers in the new command, later said of ARDC, "There were a lot of people who were trying to insure that it was not born."

In any case, by 1952, after a bewildering succession of administrative twists and turns, the Office of Air Research had become the Office of Scientific Research. OSR had slightly over $1 million—transferred to it from its parent agency, the Air Research and Development Command—and it had 39 contracts "scarcely enough to keep its staff busy." What it did not have, as Komons points out, were any "illusions about the attractions of basic research . . . among the keepers of the purse strings." General James H. Doolittle, long a proponent of basic research, noted in a memo in April 1951 that "everyone is for research and

NEWS IN BRIEF

• **DISPUTE OVER NEW FDA LABORATORY**: Plans for a new laboratory for the Food and Drug Administration are bogged down in a congressional dispute over the location of the multimillion dollar facility. The House on 25 May approved planning funds for the laboratory, provided that it be located beyond a 50-mile radius of Washington, D.C. This would rule out the original FDA proposal to locate it in Beltsville, Maryland. The appropriation must now be approved by the Senate, where Daniel Brewster (D–Md.) has announced he will fight the location restriction. The laboratory, which will house the Bureau of Science Divisions of Pharmacology, Microbiology, and Nutrition, was first proposed in FDA's fiscal 1966 budget request. Congressmen who contend that too large a percentage of the federal research dollar goes to coastal states succeeded in deleting funds for the laboratory from the 1966 and 1967 appropriations. Proponents of the Beltsville site argue that the estimated $17.5 million construction cost will be increased by several million dollars if the facility is not built adjacent to the FDA headquarters laboratory in Maryland. An FDA survey of alternate sites named the University of Wisconsin at Madison as its first choice.

• **CARNEGIE, MELLON JOIN NAMES**: The new institution formed by the merger of Carnegie Institute of Technology and the Mellon Institute has been named Carnegie-Mellon University. The announcement was made during commencement exercises at Carnegie on 5 June. The name change will be effective on 17 July. All previous accounts of the Pittsburgh merger had referred to the planned institution as Carnegie University (*Science*, 10 February).

• **AUSTRALIANS PLAN 150-INCH TELESCOPE**: The Australian and British governments have completed an agreement to build and operate jointly a 150-inch optical telescope at the Australian National University's astronomical field station near Coonabarabran, New South Wales. This follows by less than 2 months the U.S. announcement that a 150-inch telescope is planned for the Cerro Tololo Observatory in Chile (*Science*, 12 May). The Australian and Chilean telescopes will be similar and some common contractors may possibly be used. Both are scheduled for completion in 1973. Of two other proposals for major telescopes in the Southern Hemisphere one has been dropped and the other is still under consideration. Plans for a 150-inch telescope, jointly sponsored by the University of California and Australia, were cancelled months before the agreement between Britain and Australia. A proposal by the Carnegie Institution of Washington to build a 200-inch telescope in Chile is still being pursued.

• **NEW HEALTH SERVICE PROGRAMS**: The National Institute of General Medical Sciences of the Public Health Service has awarded $155,000 to the University of Rochester School of Medicine to establish a center for research and training in toxicology. Under another PHS grant of $38,050, the nation's first program for training doctoral candidates in techniques of pollution-free disposal of solid wastes will be established at the University of Kansas at Lawrence.

• **MENTAL HEALTH AMENDMENTS OF 1967**: The House and Senate have authorized an appropriation of $238 million to extend the present program of construction and staffing grants for community mental health centers through 30 June 1970. The original Community Mental Health Centers Act of 1963 authorized appropriations of $223.5 million for the program. The new authorization would provide matching construction grants of $50 million in fiscal 1968; $60 million in fiscal 1969, and $70 million in fiscal 1970. Matching grants for the initial staffing of the centers were authorized through fiscal 1968 in the original bill. The amendments would add $26 million for fiscal 1969 and $32 million in fiscal 1970. Changes contained in the 1967 amendments include amending the term "construction" to permit acquisition of existing buildings and making federal hospitals, as well as nonfederal institutions, eligible for Public Health Service funds for research, training, or demonstration project.

development. However, very few people will sacrifice for it." To which Komons adds, "During the early 1950s, the Air Force sacrificed little for basic research, especially money. OSR's budgets, in relation to the total Air Force R & D effort, were mercilessly low. And there was little inclination to bolster them. People in high places even had doubts as to the propriety of the Air Force having a basic research budget."

Since the amorphous and unplanned state of federal relations with the nation's universities is a standard source of concern, in political as well as in academic circles, it is worth taking note of an episode that Komons describes in some detail. In 1952, Lieutenant General Earle E. Partridge, commander of ARDC, became concerned that universities might become overly dependent upon federal research support. Accordingly, he wrote to Detlev Bronk, president of the National Academy of Sciences, proposing a study to assist OSR in assessing "the proper role of universities as educational and research institutions, the needs of the Air Force, and the overall good of the Nation."

Komons relates that when word of this proposal reached Lieutenant General L. C. Craigie, deputy chief of staff for development, USAF Headquarters, Craigie wrote Partridge a letter that "severely criticized the proposed study. . . . The nub of Craigie's criticism was that the Air Force had no role in the support of university research; this was the job of the National Science Foundation. The Air Force did not support university research, according to Craigie, it bought university research. Hence the Air Force had no direct concern with the impact of federal research support on universities." In some manner, Komons relates, a copy of Craigie's letter came to Bronk. Komons reports that Bronk, who was involved with Craigie in a wondrously tangled hassle over another advisory matter concerning the Air Force, "was still bristling over Craigie's letter . . . six months after the event. . . ." Bronk "could not think of the letter with any show of calm." In an encounter with Colonel Oliver G. Haywood, chief of OSR, Bronk was reported to have described the Craigie affair as "The worst example of bureaucratic fostering of socialism in this democracy that I have ever encountered."

One of the great ironies of OSR's struggling years is that, whenever it came up for money, it was bludgeoned with the argument that Congress had created the National Science Foundation to support basic research. The Congress, at that time, was annually cutting the guts out of NSF's budgets; nevertheless, the Bureau of the Budget began to clamp down on the growth designs of the military research agencies, in the expectation that, if their revenues declined, it might be easier for NSF's to grow. Komons relates that ONR, which had its own congressional mandate to support extramural research, stood its ground and successfully fought the Bureau. OSR, which had all of $7.6 million for research in 1953, chose to camouflage its efforts. Komons provides the following account: "General Donald Yates, the director of research and development, Headquarters, USAF, told OSR that budgetary line items for research in chemistry, and physics, and other sciences were not simply defensible. But Yates, while he was unwilling to argue the Air Force's case with the Bureau of the Budget, was also unwilling to see the Air Force abandon basic research. was moved under a line item for the B-58 (bomber). And, for all the Budget Bureau knew, the $4.7 million it approved was for research connected with the development of the aircraft, clearly within the realm of applied research. But, in reality, this money was handed over to OSR to use, as originally planned, for basic research."

"Semantic Perversion"

For several years thereafter, Komons relates, bootlegging and subterfuge became a way of life for OSR. When the 1955 budget was being prepared, General James McCormack, Jr., director of R&D in USAF Headquarters, "made it clear that AFOSR could not hope to get any money unless it accepted a certain amount of semantic perversion in its programming. . . . Basic research and applied research were dropped from the programming idiom, replaced in turn by exploratory research and supporting research. . . . Exploratory research, which now becomes the sole business of AFOSR, was little more than basic research under a new guise." But, with the Bureau of the Budget insisting that basic research belonged to NSF—though the Foundation was actually in worse shape financially than OSR—labels became critically important: ". . . any and all line items that smacked of ivy and ivory towers were blotted out," Komons writes. "In their place arose such categories as electronics, materials, propulsion, and what have you. The more practical a category sounded, the better. . . . The effort worked. AFOSR talked of applications, and the Bureau of the Budget loosened the purse strings."

Said one OSR administrator: "We sold them the sizzle, not the steak."

Support of the Stanford Mark II linear accelerator came under the heading of "propulsion," causing one OSR official to remark, "One might expect it go into orbit at any moment."

"Thus, states Komons, while the general scientific character of AFOSR's program remained constant, the facade that AFOSR held before the Congress, the Bureau of the Budget, and the rest of the federal fiscal apparatus was constant only in the regularity of its changing character. AFOSR saw to it that it was always in vogue."

OSR's heady successes with bootlegging coincided with another turn of events. According to Komons, Lieutenant General Thomas S. Power, who took over ARDC in 1954, was one of the Air Force's more skillful money raisers. With an "intuitive" belief in the value of research, Power set out to get more money for OSR. When he discovered that OSR was undercutting its own case for a bigger budget by moving slowly in spending what it had on hand, Power decreed that OSR "must go 'intelligently broke.' " With its projects camouflaged as applied research, Power bringing in more money, and its program directors spending it faster and faster, OSR did splendidly: the 1955 budget rose 40 percent, to $9.4 million; next year it was $13.9 million, and the following year the figure rose to $16.3 million.

How did Power feel about the techniques that were being employed to speed OSR's growth? In mid-1956 he visited AFOSR. According to a memo summarizing his visit, the General made the following point: "You can't tell and sell the public and the world on these things in such a way that they believe that this is just sky blue thinking." AFOSR, he said, had to be "truthfully deceitful" about its program so as to "coat" it with a look of practicality.

In the summer and fall of 1957, when Defense Secretary Charles B. Wilson was determined to set the pace for the Eisenhower administration's most massive austerity drive, things looked bleak for OSR. General Power had indicated that the budget figure might be as much as $25 million, but when the cutting began, it appeared that OSR would be slashed down to a total budget of $11 million. Since, under Power's policy, OSR had been obligating money faster than it was getting it, it would be hard pressed to match its promises, let alone undertake any expansion. Despite its rapidly risen affluence, OSR's essentially shaky nature was revealed by the crisis. Says Komons: "One thing university administrators could not understand was how the Army and Navy had managed to go through the ordeal with a minimum of confusion while AFOSR stood on the verge of collapse.

Appeal to White House

But OSR's bureaucracy had not been cultivating the universities without effect. Komons relates that it took its troubles to Jerome B. Wiesner, I. I. Rabi, and Lee A. DuBridge, "three of the most influential men in science. . . . Rabi took the matter directly to the White House, where it was received with sympathy, and the crisis began to take on some fluidity." Actually how Rabi fared at the White House became irrelevant, for a few days later the Russians orbited Sputnik and OSR found itself with a budget of $22.5 million. In 1960, after a few more administrative shuffles, OSR was designated *the* Air Force agency for basic research. But, as Komons describes it, a variety of new administrative squabbles suddenly began to overwhelm the office. OSR began to fall apart, then, as he tells it, it was put back together again, and as the history ends, with the year 1962, it was in a condition of "maturity and well-being," which, presumably, prevails to this day.

What the history does not tell us is the cause of the Air Force's schizoid relationship with basic research. That lack does not detract from Komons' achievement. He has done a splendid job of telling, in many instances for the first time, what happened, and that is no small gain for an understanding of the subject. But how can we account for the fact that the Air Force managed to compile so bungling a record in efforts to become a supporter of basic research? There is no readily apparent answer. Maybe the Air Force

was plain dumb, or maybe it was quite smart in concluding that the outer reaches of basic research have little to do with running the Air Force. In any case, it would be difficult to demonstrate that the Navy, with its long and happy relationship with basic research, is scientifically or technically better off than the Air Force, with its legacy of clumsy dealings with science. It is interesting to recall that the much-debated Project Hindsight, which studied the scientific and technical origins of modern weaponry, concluded that "the data do not provide much of a case for the utility of recent undirected science, that is, science produced within the last 10 to 20 years." There is no doubt that Defense money has been good for basic research, but whether the resarch it has supported has been good for defense is an issue on which contention is great and evidence is sparse.—D. S. GREENBERG

Rural Health: OEO Launches Bold Mississippi Project

In the health field, medical research was the favored child of previous administrations and research activities flourished. The Johnson administration, though by no means allowing the research establishment to suffer harsh deprivation, has been placing a new emphasis on the delivery of health services. Accordingly, the effort under the antipoverty program to provide comprehensive health care centers for the poor is, while still small, growing rapidly. The first "neighborhood health centers" were established in urban slums, but soon some centers will be springing up in rural America. There the problem is not so much that of reorganizing and supplementing available health resources—the great need in the cities—as that of creating resources where few now exist.

By 1 June the Office of Economic Opportunity (OEO) had made grants totaling more than $30 million for a score of comprehensive health projects, including six rural projects approved within the last few months. Neighborhood health centers are operating in Denver (*Science*, 29 July 1966), Boston, New York, and several other cities. Now Tufts University School of Medicine, which is operating the Columbia Point project in Boston, will undertake a similar venture in the Mississippi community of Mound Bayou, an all-Negro town in Bolivar County, at the heart of the cotton-growing delta region.

The Mound Bayou center, the first and most ambitious of the comprehensive rural health projects OEO has approved, will open this August and begin serving the poor of a 400-square-mile area with a population of about 14,000. The estimated cost of the project during its first 9 months is about $1 million, which will cover the purchase of medical equipment as well as operating expenses. Other rural or rural-and-small-town health-center projects approved by OEO include those planned for Monterey County, California, Bellaire, Ohio, and two counties in Appalachian Kentucky.

A steady increase in the number of neighborhood health centers, urban and rural, is contemplated. President Johnson has endorsed an OEO goal of 50 centers in operation by July 1968. Besides being appreciated in their own right, the centers are regarded by some antipoverty strategists as an excellent entering wedge for an extensive antipoverty effort. As one health project director put it, "Even if you don't give a damn about dead babies, it's just not politic to say so."

The Mound Bayou center, or "Delta Community Health Agency," represents an attempt to shape a winning strategy for aiding one of the nation's major poverty groups. Not only do the Negroes of the rural South constitute a large poverty group in their native region but they are the source of the great flow of migrants into the ghettoes of the cities of the North and West. The project at Mound Bayou will not be typical of others OEO may sponsor in the South, for it skirts certain racial and political problems. Ordinarily OEO expects local community action agencies (CAP's) to serve as project contractors. But the planning that has led to the Mound Bayou center was initiated by Tufts Medical School's department of preventive medicine as a research and demonstration project. If the Bolivar County CAP had initiated the project—not a likely possibility—the difficulty of doing anything truly innovative in the face of opposition from the delta area's extremely conservative politicians and physicians would have been enormous. Tufts, by selecting a Negro community as the site and by contributing its own professional resources to the center, seems to have largely avoided this problem.

Nearly two-thirds of Bolivar County's 58,400 inhabitants are Negroes, and for 60 squares miles or so around Mound Bayou, in the northern part of the county, almost all the land is Negro-owned. Mound Bayou traces its beginnings to the period following Reconstruction; it became an incorporated town in 1898 and now has a population of about 1300. The mayor and other local officials are Negroes.

Although the Mound Bayou area has an unusual number of Negroes earning decent livings from their cotton farms and business enterprises, the population in general is poor and the pressures to migrate are heavy. From 1950 to 1960, in the county as a whole, the Negro population declined by more than 14 percent. A high infant mortality rate (56.2 per 1000 live births during 1964) indicates the deplorable health conditions under which most Bolivar Negroes live. And in Bolivar, as elsewhere, the companion of poverty and ill health is ignorance. At least half of the county's adult Negroes have less than a fifth-grade education.

Left to itself, Bolivar would be a long time in bringing good health services to the Negro population. There are some 20 physicians, three of them Negroes, practicing in the county; only a few live in the area in which the OEO health center is to provide intensive service. In this area there are two small, financially hard-pressed