THE PHYSICISTS
The History of a Scientific Community in Modern America
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Budget Bureau or with Maury Maverick, the former mayor of San Antonio, Texas, and the head of the Smaller War Plants Administration, who recognized the degree of concentration of defense research contracts and who in October 1945 exploded to a congressional committee: “I get a little tired of these hired hands of the monopolies and some of the professors . . . piously abrogating [sic] to themselves all the patriotism . . . I’m not sure that the office holder has been, and is, more conscious of the public welfare than many scientists. . . . Let us all bear in mind that we have a political Government and that our Constitution is a political instrument. The political character of our Government guarantees democracy and freedom, in which the people, through their Government, decide what they want.”

At the opening of the atomic age, the revolutionary needs of national security had joined the older requirements of economic development to force an end to what had long been, de facto, a federal policy of laissez-faire in physics. Bush was willing to endorse that end insofar as he was willing to put the government into the business of funding academic scientific research outside of agriculture. But if Kilgore’s program was directed at mobilizing scientific research in a fashion politically responsive to the nation’s best needs, Bush’s was to enlist the nation’s resources, through a politically elitist mechanism, to satisfy the scientific community’s traditional goal of advancing the best science. Like George Ellery Hale at the end of World War I, Bush may have thought that his program disinterestedly sought the apolitical national interest. Set against Kilgore, Bush insisted upon a politically conservative interpretation of what the end of laissez-faire was to mean in postwar America for the Los Alamos generation and its science.


For weeks after the end of the war, scientists waited impatiently for a presidential message to Congress on the domestic control of atomic energy. The message finally was delivered on October 3, 1945, accompanying an administration bill. The measure had been drafted in the War Department and it was introduced that day by the chairmen of the two military affairs committees, Congressman Andrew J. May of Kentucky and Senator Edwin C. Johnson of Colorado.

The May-Johnson bill proposed to vest virtually complete authority over nuclear research and development in an Atomic Energy Commission, which, in a politically elitist fashion, was to consist of part-time members appointed by the President but insulated to an extraordinary degree from his removal power. The bill included some weakly worded clauses designed to discourage monopolistic practices in the exploitation of atomic energy by private industry. Beyond that, the measure displayed little concern with the social and economic impact of nuclear fission and it ignored the task of balancing the Commission’s program between civilian and military needs. The May-Johnson bill went at the control of nuclear energy more in the manner of Bush, who had suggested a number of its features, than of Kilgore. In tone, and to a degree in substance, it also made the chief object of the nation’s nuclear energy program seem to be not the peaceful but the military atom.

In the Truman administration, the implications of the bill were recognized by Don K. Price at the Bureau of the Budget and James R. Newman at the Office of War Mobilization and Reconstruction. Price, a Rhodes Scholar and an authority on public administration, was Harold Smith’s chief staff man on policy for science. Newman, a product of City College of New York and Columbia Law School, a former counsel for the American Jewish Committee and the Anti-Defamation League, was an irreplaceable, outspoken liberal, with a sparkling mind and considerable literacy in science, philosophy, and mathematics. To both Price and Newman, the May-Johnson bill’s egregiously independent, part-time Commission flagrantly violated the principle that the President should exercise direct control over all executive agencies. Newman, an enthusiast of Kilgore’s program, especially the senator’s commitment to planning socially purposeful research, thought that the bill also gave too little emphasis to civilian uses of atomic energy, had too few teeth in its antimonopoly clauses, and left too much of the nation’s nuclear future, including its advancement of basic nuclear research, up to the vague good faith of private institutions. Inside the executive branch, Newman and Price launched an offensive for an atomic energy program based on sound principles of public administration and the imaginative adaptation of liberal doctrine to a revolutionary field.

The May-Johnson bill also angered many of the nation’s atomic scientists. It seemed to permit domination of the proposed Commission by the military. It also subjected almost all nuclear research in the country to rigid security restrictions, with penalties for violators ranging upward from a fine of $100,000 and a ten-year prison term. To many atomic scientists, the promilitary and security features of the bill threatened to interfere with the conduct of nuclear studies; like every other branch of science, nuclear exploration required a reasonably free flow of information. More important, both features seemed sure to signal to the rest of the world that the United States’ primary nuclear interest was in weapons, a posture that would diminish the chances for preventing a nuclear arms race. These objections were felt most strongly among the rank and file of atomic scientists. The May-Johnson bill was endorsed by Bush, Conant, Lawrence, Fermi, Arthur Compton, and even Oppenheimer. To all save Oppenheimer, who vacillated, the faults of the bill were exaggerated. Bush privately labeled as “absurd” the charge that the measure would lead to military domination of atomic energy. In certain quarters of the Manhattan Project, notably the Metallurgical Laboratory, a conviction that the Frank Report had not been given a full hearing before

Hiroshima had already made the wartime administrators of science suspect. Now a number of Project scientists concluded with Herbert Anderson, a highly respected physicist who had been at the Metallurgical Laboratory: “I must confess my confidence in our leaders Oppenheimer, Lawrence, Compton, and Fermi . . . who enjoined us to have faith in them and not influence this legislation, is shaken. . . . Let us beware of any breach of our rights as men and citizens.” As men, citizens, and socially responsible scientists, Project veterans like Anderson decided to take legislative matters into their own hands.

In the fall of 1945, scores of atomic scientists descended upon Washington to buttonhole congressmen, lobby within the administration, and educate the public to the necessity for a civilian-controlled program of atomic energy free of unreasonable security restrictions. They started in a single fourth-floor walk-up with a desk, telephone, ancient typewriter, and $20 worth of stationery. Backed by a growing number of study and discussion groups at Project sites and campuses around the country, by early 1946 they formed the active center of the new Federation of American Scientists, with their own magazine, the Bulletin of the Atomic Scientists. The leader of the Washington group was thirty-five-year-old William Higinbotham, a physicist who had left his graduate studies at Cornell to join the Red Lab, then finished the war as an electronics specialist at Los Alamos. Like most of the Washington activists, he was not one of the nation’s prominent atomic scientists, but Higinbotham and his young allies, “quiet, modest, lucid and impPELLingly convincing,” in the judgment of the liberal newscaster Raymond Gram Swing, did a good deal to shift influential public opinion against the May-Johnson bill.

In the administration, the scientists’ lobby linked up with Price and Newman, who soon added to his program the complete exclusion of the military from the Commission; in the Congress they found a champion in Senator Brien R. McMahon. A former assistant attorney general of the United States, a Democrat and New Dealer, McMahon was a determined freshman from Connecticut. In December 1945 he introduced a bill—it had been drafted by Newman and an associate—for an atomic energy program civilian in control, liberal in purpose, and responsive to the political system. Soon President Truman, who increasingly relied on Newman as his special adviser on atomic energy, shifted to the McMahon bill. In the Congress, many moderates and even conservatives, following the lead of Senator Arthur H. Vandenberg, gathered behind the measure because the field of atomic energy was so new, revolutionary, and fraught with urgent considerations of national security. In July 1946,

Anderson is quoted ibid., p. 149, Bush to Conant, Nov. 4, 1946, YB, Box 27, file 614.

Quoted ibid., p. 171.


after the bill had been modified to give the military a certain—some said significant—voice in the atomic energy program, the McMahon bill passed the Congress with bipartisan support.\(^8\)

The act created a full-time, civilian Atomic Energy Commission, whose members were to be appointed by and responsible to the President. It awarded the Commission complete control over the production, ownership, and use of fissionable material; it also prohibited the issue of patents for inventions applicable solely in the atomic energy field. Thus rendering atomic energy virtually a state monopoly, the act not only instructed but vigorously equipped the Commission to sponsor pure and applied research in its field, to foster socially as well as militarily purposeful investigations, to encourage competition in the private sector through licensing, and to prevent any industrial corporation from cornering and possibly suppressing a new development threatening to its market position. No less important to most of the nation's scientists, the act enabled the Commission to assure the widespread dissemination of nuclear information, pure and practical, subject to appropriate international agreements and security restrictions which they found acceptable.

In October 1946 President Truman nominated as the first chairman of the Commission David E. Lilienthal, the former head of TVA, who in the course of his confirmation hearings delivered one of the memorable lectures of the day on the relationship between civil liberties and security in a democratic state. The other commissioners included Robert F. Bacher, who had left the Rad Lab to accept an appointment at Los Alamos on the understanding that he would depart the mesa the moment he had to put on a military uniform. If the Atomic Energy Act of 1946 was a victory for civilian control of a singularly important branch of physical research, later critics of the Commission's practices would declare it a triumph for private over public interests. But at the time, in the context of the broader issues in postwar policy for science, Newman could justly call it a victory for a basic principle—"the proposition that the self-regulating mechanism of the market place cannot always be depended upon to produce adequate results in scientific research."\(^9\)

The Atomic Energy Act left most of the vast field of nonnuclear defense research to the armed services, which were eager to follow the dictum of the journal *Army Ordnance*: The maintenance of military superiority in peacetime would require "the marshaling of the best scientific brainpower of our country . . . from our great private research laboratories . . . educational institutions and . . . technical and scientific societies."\(^9\) Armed service planners aimed to enlist civilian scientists as

*Advisers upon the substance, the conduct, and the strategic implications of military research and development programs. They also intended to continue awarding contracts to industrial and academic laboratories for applied military research. And the more thoughtful planners worried whether the War and Navy departments ought not to go beyond the nuts-and-bolts development of hardware and help overcome the depletion in the nation's bank account of fundamental scientific knowledge and manpower.

Climaxed by Hiroshima, the miracles of OSRD had driven home to the armed services the military importance of two types of fundamental research. The first was the study of subjects clearly related to military technology, such as the behavior of electromagnetic radiation at the frequencies of microwave radar. The second was the familiar pure science, most commonly exemplified in the discussions of 1945 by the nuclear explorations that had made possible the atomic bomb. The first would contribute directly to the improvement of military technology; either could yield radically new weapons in the future. Conducted on the campuses with the aid of graduate students, both would enlarge the pool of trained scientific manpower. Now, when even Secretary Robert Patterson admitted that the army might have treated draft-eligible scientists too strictly, the armed services strongly endorsed peacetime federal programs outside of atomic energy in both types of fundamental research, but especially in the militarily pertinent kind so obviously in the long-range interest of national defense.\(^8\)

Admiral Furer's wartime staff had included especially keen advocates of such research—a group of bright, imaginative, resourceful young naval officers, most of them Ph.D.'s in science, who, in the argot of their outfit, as the admiral's "Bird Dogs," his cocky troubleshooting ambassadors to the naval operating arms. In the middle of the war the Bird Dogs began advancing a plan for a peacetime central office of naval research. Its chief duty in their prospectus was to sponsor, not only in the navy

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\(^8\) Early in 1945, the secretaries of war and navy had established a joint military-civilian group in the National Academy of Sciences to carry on a militarily related program of fundamental research when OSRD went out of business. The reason the Academy was for the interim, until a permanent, peacetime agency could be established. But the interim was no excuse for such an arrangement in the opinion of the Budget Bureau, including Harold Smith, who recognized that under the control of the politically elite Academy the group would "not be responsible to any part of the Government." At Smith's urging, FDR directed his secretaries of war and navy to withhold all funds and projects from the Academy group. Not long after FDR's death, following a Smith visit to the Oval Office, President Truman referred to Smithsonian and Forestal that had control of military research and development "must at all times be lodged solely within the framework of the government." Smith to Franklin D. Roosevelt, March 31, 1945; Roosevelt to Bush and Roosevelt to Secretaries of War and Navy, March 31, 1945, FDR, OF 330-5; Truman to Secretary of War, June 8, 1945, attached to Truman to Bush, June 8, 1945, OSR, Entry 1, Cooperation: RBNS, Smith, "Conference with President Truman, June 8, 1945," FDR.


but in the best qualified civilian laboratories, the fundamental research essential for the creation of radically new weapons.1 The Bird Dogs and their clients got a chance to turn their idea into policy when they became part of a new research office that Secretary Forrestal, acting under his temporary war powers, created in May 1945. In 1946 Congress made the agency permanent as the Office of Naval Research, or ONR.

The new Office was headed by Admiral Harold G. Bowen, the forceful head of the Naval Research Laboratory. Bowen was no friend of the regular bureaus, they had banished him to the Research Laboratory, a kind of purgatory in the prewar years, after he fought to introduce the use of superheated steam. Now Bowen wanted to push the development of a nuclear-powered navy. He was also stillsmarting at the high-handed and supercilious way that the OSRD hierarchy had treated the navy's scientific arms during the war, and smarting all the more now that the Rad Lab was getting all the credit for wartime radar. Bowen found congenial to his own predilections the Bird Dogs' advocacy of a program of fundamental naval research conducted independently of the bureaus. And he was ready to carry out the program with zeal. The zeal possibly reflected an eagerness to enlist academic physicists in his drive for nuclear-powered ships.2 It almost certainly revealed a determination to show that his part of the navy could manage civilian scientific research at least as well as Bush and OSRD.

In the fall of 1945 Bowen and his staff traveled around the country with promises of research funds and promptly raised suspicions among academic scientists. Would not military support involve irritating red tape, crippling security restrictions, and projects of primarily military, not scientific, interest? But Bowen's Office minimized the red tape and allowed university scientists virtually complete freedom in the conduct and publication of their research. Equally important, Bowen's Office funded not only militarily relevant but even pure research projects. It also left the initiative for proposing the projects up to the academics. The navy chose which projects to support with the help of a cadre of civilian scientific advisers, whose members included Warren Weaver as chairman, Lee A. DuBridge, and the Compton brothers.3


2Straws to Secretaries, April 6, 1949, copy kindly supplied by Edward L. Bowen; Lewis Strauss to Secretary of the Navy, May 35, 1945, JFN, file 10-1-8; Forer Diary, May 29, 1945, June 4, 1945, JAF; Harvey M. Sapochnik, "The Origins of the Office of Naval Rechain," chapter two, ONR: Science and the Navy (in preparation).


In February 1946 Bowen's staff announced that they had negotiated contracts with forty-five schools and industrial firms, by August 1946, when the bill establishing ONR was signed into law, Bowen already had in force 177 contracts, totaling $74,000,000, with eighty-one universities or private and industrial laboratories. ONR was supporting more than 602 academic research projects, which together involved some two thousand scientists and an equal number of graduate students. It was building cyclotrons and betatrons, signing up astronomers, chemists, physiological botanists, branching out into such unmitigated studies as meteors, rare earths, and plant cells.4

Yet at least some scientists worried with Harlow Shapley, the prominent Harvard astronomer and political activist, who declared: The government's "intercession in American science . . . has altered, and perhaps become ominous . . . because of the Navy's great move in supporting science on a wide basis . . . Those who were worried about domination of freedom in American science by the great industries, can now worry about domination by the military."5 ONR may have permitted scientists to pursue and publish what they wanted, but it did decide what to support in part on criteria of utility to the navy. In any case, the degree of scientific freedom allowed by Bowen's operation was scarcely the whole issue. Earlier, Admiral Furer had argued that naval support of civilian research would win the service a cadre of distinguished scientists who would act as "ambassadors of national preparedness" in the civilian scientific community. Now, the army chief of staff for research and development observed, the military was said to be making "prisoners of war" of the nation's scientists.6 Whatever Furer's enthusiasm, such overwhelmingly military patronage of academic science—the Office of Naval Research accounted for three out of four of all federal dollars spent for such fundamental research—scarcely made for sound public policy. It might produce fine science, but it threatened to bind too many of the nation's scientists to the military's purposes and bureaucratic self-interest.

The military domination of academic science was a matter of some


5Harlow Shapley to Isaiah Bowman, Nov. 6, 1946, VB, Box 13, Bowman file.


7Naval Coordinator (Furer) to All Bureaus and Offices, Feb. 23, 1945, JFN, file 39-1-8; Major General H. S. Arnold to the Secretary of War, WDGS, Legislative and Liaison Division, Bill File S. 1850.
concern in the Bureau of the Budget, which had approved the entrance of Bowen’s office into the large-scale support of fundamental research only as an interim arrangement. The navy had agreed that, once the National Science Foundation was created, the bulk of the pure and even some of the militarily related research projects of ONR would be turned over to the new agency, where they belonged. In the Budget Bureau and among thoughtful members of the scientific community, the way to halt the increasing military role in academic science was for Congress to create the foundation as soon as possible.

Early in the summer of 1945, to advance his version of such a foundation, Bush had a bill drafted in OSRD and introduced by Senator Warren G. Magnuson of Washington, a freshman New Deal Democrat. At hearings on the Kilgore and Magnuson bills in the fall, all ninety-nine witnesses save one—Frank B. Jewett—endorsed the creation of a single federal agency that would award grants, contracts, and fellowships to sponsor training and fundamental research, including militarily relevant research, in all fields of the natural sciences. But there was no such consensus about the key issues dividing Kilgore and Bush: planning, social sciences, governmental distribution, patents, and, above all, the degree of programmatic control by the President. The issue of presidential control, which drew the most attention at the hearings, found specific expression in a dispute over the proposed foundation’s administrative structure. In Kilgore’s politically responsive scheme, the foundation was to be managed by a director appointed by and responsible to the President. In Bush’s politically elitist approach, the foundation would be governed by a presidentially appointed part-time board of private citizens, mainly scientists, who would choose a director responsible not to the President but to themselves.

To Don K. Price and James R. Newman, the dispute over the foundation raised much the same issues as the battle over atomic energy. Together with Harold Smith they formed a coalition against Bush with considerable influence in the White House, and in the President’s first postwar legislative message, paragraphs written by or governed by Kilgore’s general program the program of the Truman administration. Kilgore, who faced an election in the fall of 1946, seemed to want a passable bill. Early in 1946 he introduced a revised measure—it was designated S. 1830—which compromised on details but maintained his program’s social purposefulness and degree of presidential control.8 In July 1945, intact save for its social science clause—the social sciences, it was contended on the floor, were merely elaborate ways by which some people told many others how to behave, especially in politics—passed the Senate.8 But in the House, the young Arkansas Congressman Wilbur D. Mills had introduced a bill along the lines of the original Bush program. Anxious to get home to campaign for reelection, Mills and his colleagues declared themselves unable to resolve the complex differences between the Mills bill and S. 1830. The foundation failed in the 79th Congress.

When the Republican-dominated 80th Congress convened in January 1947, leadership for a foundation bill was assigned to Senator H. Alexander Smith of New Jersey. A first-term senator in his mid-sixties, Smith was a Princeton graduate and an acolyte of Woodrow Wilson in international affairs, a successful corporation lawyer and devotee of his alma mater—in the 1920s he interrupted his legal career to be secretary of the university—a conservative Republican disposed to sympathize with the views of professors from private colleges in the East, including the politically elite, best-science views of Vannevar Bush. Smith drew up a new bill that closely followed Bush’s approach on key points, including governmental distribution and insulation from presidential control. In the summer of 1947, despite objections of senators from scientifically have-not states, Congress passed the Smith measure. But President Truman vetoed the bill, explaining that he could not approve the establishment of an executive agency so far beyond the control of the nation’s chief executive.9

The veto message emphasized that the President would gladly sign into law an act establishing a science foundation subject to the President’s


Arguing in 1946 for a foundation insulated from the President’s control, Senator Smith had claimed that scientists were “not at all controlled by the consideration of who pays them the money, whether it comes from the Government, or whether it comes from private sources. They are inspired by their interest in the subject, by their dedication to the pursuit of knowledge.” U.S. Congress, Senate, Congressional Record, July 2, 1946, p. 8113.

It is interesting to note that Senator Wayne Morse of Oregon, who had urged the Senate, unsuccessfully, to incorporate a clause mandating that the military cannot afford to support so much basic research . . . When this time arises the colleges will be faced with the unpleasant dilemma of finding other sources of funds, firing some of their staff, and closing down laboratories, or accepting applied research on weapons with the necessary security restrictions.” Untitled memorandum, n.d. (April 1947), ORB, series 93-21, file 53, W. L. Clark III to Director, Planning Division, Office of Naval Research, May 29, 1946, ONR, Planning Division file.
Foundation, limited by its organic act to a ceiling of $15,000,000 in any one year, was struggling along on a piddling appropriation of $750,000. Badger Bureau planners may have expected the Foundation to be their chief federal sponsor of basic research, but the Public Health Service successfully fought to keep its rapidly growing programs of such research in medicine. Although at least one-third of Office of Naval Research dollars were spent on pure research projects only remotely related to naval purposes, ONR had reneged on its agreement tocede any of its fundamental research, militarily relevant or even pure, to the new Foundation.8 Unless the navy was in direct contact with the men actually conducting basic research, Secretary Forrestal argued to a congressmen, the fleet and air arms could not remain abreast of current scientific discoveries. In 1949 the Defense Department together with the Atomic Energy Commission accounted for 96 percent of all federal dollars spent on the campuses for research in the physical sciences. For every two of those dollars spent by the AEC, the military spent at least three.9

Of course the military enjoyed considerable power because of the mounting Cold War concern with national security. Military requirements compelled even the civilian Atomic Energy Commission to stress research and development for weapons, notably the hydrogen bomb. But the AEC never permitted itself to become a mere nuclear weapons contractor for the Department of Defense. By virtue of its mandate and its civilian control, it could and did maintain an ongoing investment in the peaceful uses of atomic energy, including the development of nuclear power; late in 1951, at an AEC laboratory, a nuclear reactor first transformed atomic power into 45 kilowatts of electrical energy.10 In the absence of a National Science Foundation between 1945 and 1950, no comparable institutional sponsor of fundamental physical research for civilian needs had existed, nor had any comparable institutional mechanism to plan, if not to enforce, a research program in the physical sciences better balanced between civilian and military purposes.

Once created, the Foundation was legally authorized to slip an evaluative check rein over agency research programs, but the defense agencies were determined to resist such judgment. Their opposition was redoubled upon the first director of the Foundation, the physicist Alan Waterman, a student and protégé of Karl Compton's, a member of the Yale faculty, and a wartime veteran of the OSRD Office of Field Services. Shortly

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after the Japanese surrender, Waterman was appointed chief scientist at the Office of Naval Research. He was deliberate, firm, modest, patient, and above all prudent. He consistently opposed the transfer of most of the military's fundamental research programs to the National Science Foundation before its creation. Now, after its establishment, he proposed to ignore the Foundation's mandate for planning. Along with considering any centralized evaluation of federal research impossible and inappropriate, he was also worried about pitting his infant, penurious, and decidedly vulnerable agency against such giants as the Department of Defense.

Perhaps under the circumstances Waterman was wise to avoid taking on the defense research agencies. Whatever the merits of his judgment, the task of planning and evaluation was certainly much more difficult in 1950 than it would have been in 1946, when even the armed services had been willing to concede the primary sponsorship of fundamental research to civilian hands. In retrospect, the delay in the establishment of the National Science Foundation was critically important in the evolution of postwar policy for research and development, not least because it cost the nation a program balanced between civilian and military patronage and purpose.

James B. Conant, who from the beginning worried about the increasingly military patronage of American science, later blamed the delay in the passage of the bill for a National Science Foundation upon President Truman, mainly for his 1947 veto.2 Conant might have enlarged his reckoning of responsibility to include the congressional conservatives who blocked the passage of the bill before as well as after the veto and who in 1947, persuaded by Senator Taft's declaration that he would prefer no foundation at all to one under the President's control, sent the White House a politically elitist measure. True enough, in 1946 the

1 Carey to Stapp, Feb. 24, 1950; James L. Grail to Carey, April 3, 1951, BOB, series 39.33, unit 94 and file 93; Milton Lomask, A Minor Miracle: An Informal History of the National Science Foundation (Washington, D.C., 1976), pp. 73-74, 83. After the Korean War broke out, the defense research agencies demanded still higher—some observers thought exorbitantly higher—funding. In the Bureau of the Budget, Vice President Coolidge watched the trend apprehensively. One day in the spring of 1952, Coolidge went over to the Foundation's headquarters on California Street in Washington—"a rambling old house with a pipe brick exterior and a kind of mouldly sanctity," he described it—to plead Waterman into making active use of his planning mandate. He found Waterman running the Foundation like "a dean of studies" in "an atmosphere of unhurried deliberateness, and good if not fashionable living." The Foundation was "settling down costly with the Defense Department . . . in joint planning activities. . . . Waterman's idea is to operate on the basis of the scientist-to-scientist approach. . . . Out of this spiritual communion will emerge gentlemen's agreements leading to the formation of spheres of influence for research sponsorship." Carey to Stapp, May 15, 1952, BOB, series 39.33, file 93.


President scarcely threw the full weight of his office behind the passage of S. 1859, and afterward he displayed much less concern with the substance of the program than with its control. But while in 1947 his advisers in the Budget Bureau understood that the veto might prolong indefinitely the military ascendency over academic science, they also agreed with Don K. Price, by then at the Public Administration Clearing House in Chicago, who argued in a special memorandum that the President must veto the bill. Along with giving control over a federal granting agency to people who would be getting the grants, Price pointed out, the measure would improperly vest the responsibility for planning an overall federal science program in officials largely beyond the reach of presidential power.

Price's analysis called up much the same objections that Secretary David Houston had advanced a quarter of a century before against George Ellery Hale's proposed executive order for the National Research Council. Yet if in key respects the issues were similar, in the post-World War II context, the stakes were much higher—"the safeguarding," in Price's phrase, "of the public's interest in (science)." So long as the choice was posed between a politically elitist and a politically responsive system, the President, who based his veto message on Price's memorandum, opted for letting the military remain the principal patron of basic research in the physical sciences.5

No single individual did more to keep the choice framed between those two alternatives than Vannevar Bush. Few scientists were better placed to affect policy than Bush, who remained in Washington as head of the Carnegie Institution and who headed the successor to the Joint New Weapons Committee in the defense establishment. No administrator of science was said to know better than Bush how to call forth the best efforts of the nation's scientific talent or to organize scientific research. No one save Oppenheimer, who was preoccupied with atomic energy policy, commanded more respect in congressional circles and among the public at large. With all his authority and prestige Bush—in the angry view of James R. Newman—systematically "sabotaged" the President's program for science.

In the fall of 1945, even after the President had endorsed the main lines of Kilgore's program and Harold Smith had spelled out the President's policy to Bush in a special letter, Bush still testified for the Magnuson bill. To help advance the bill, he even supplied Magnuson with the services of John H. Teeter, an engineer and technical aide on the


OSRD payroll. A former student and then colleague of Bush’s at MIT before going off to industry, Teeter was the kind of conservative who often confused liberalism with socialism, a political novice tending to approach congressional politics with a conspiratorial air. He tirelessly advocated Bush’s program and kept a watchful eye on the Kilgore forces, whose real aim, he was sure, was to subject science to basely political control. It was Teeter who induced Congressman Wilbur Mills to introduce his pro-Bush measure in the House.5 In the spring of 1946, despite broad academic and scientific support for the compromise S. 1850, Bush urged Senate Republicans to amend the measure back to his original program and endorsed the Mills bill in public hearings. Howard A. Meyerhoff, professor of geology at Smith College, a liberal advocate of S. 1850 and the secretary of the American Association for the Advancement of Science, bluntly pronounced the death of the Senate compromise a “homicide” committed by Bush and Teeter.6

From the beginning of the battle through the veto, Bush behaved with an unusual degree of independence for a presidentially appointed federal official. Admonished by Don K. Price and Harold Smith to get in harness with the President, Bush queried Truman: Should I consider myself a member of the official family bound not to speak publicly against administration policy? Consider yourself a member of the official family, Truman shot back, as long as you are head of OSRD.7

If Bush persistently violated the President’s wish, his friends claimed that he was only acting as a private citizen. The claim had merit, since Bush remained head of OSRD only to wind up its affairs and was not drawing a government salary in his defense post. Besides, save on some atomic energy matters, the President and his advisers did not consider Bush policy for science; under Truman, in contrast to Franklin Roosevelt, Bush was far from the center of White House power. His postwar exodus from the orbit of the Oval Office rankled. Conant believed, according to Teeter’s report, that the National Science Foundation was “V.B.’s baby,” that Bush approached the issue as a “personal matter, with much personal feeling.”8

Still, Bush was convinced that the National Science Foundation could—and should—be kept safely insulated from political accountability. No one need worry, he told President Truman, that the Foundation’s distinguished governing board of private citizens, many of them accomplished scientists, would act improperly in awarding grant money; it would make no difference that they might come from the institutions receiving the grants.9 With equal ingenuity, Bush expected to prevent the military from dominating academic science. Like the Bureau of the Budget, he backed the Navy’s support of research in the universities only as a temporary measure. Bush acknowledged that the armed services, having entered the field of basic research, seemed to want to stay in it. But he was “not at all fearful on this matter.” Bush assumed that Secretaries Patterson and Forrestal undoubtedly saw the inappropriateness of permanent military patronage in the same disinterested way as himself. And when the time came, Congress would surely recognize how “quite unreasonable” it would be to continue funneling federal money into academic science primarily through the armed services.10

Bush failed to win the battle over atomic energy legislation because most atomic scientists contested him with single-minded vigor. They engaged in no comparable campaign for Kilgore’s program, or even, the more time passed, for the speedy creation of any kind of National Science Foundation. Physical scientists who had worried about military domination in the atomic energy program in 1945 worried about it much less in physics generally after the armed services, especially ONR, proved that they would fund science tolerantly and richly. In 1948 nearly 80 percent of the papers presented at the American Physical Society meetings were said to have been supported by Office of Naval Research.

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money. In 1949 ONR paid for more than eleven hundred projects at more than two hundred institutions, at a cost of $29,000,000. About three out of every four of these Navy research dollars went to the physical sciences—and to the scientists who in the wake of Hiroshima enjoyed the most public standing and political leverage. Even Bush noted that American scientists were decidedly happy with ONR, happy enough, possibly, not to mind the absence of a National Science Foundation.2

In the contest over atomic energy legislation the scientific community was united in its opposition to Bush, and its members displayed relatively little interest in patents, social impact, or the politically elitist nature of the May-Johnson proposal. In the dispute over the National Science Foundation program, the nation’s atomic scientists were either neutral or divided with respect to such issues as patents or the social sciences. More important, whatever views physical scientists held on those matters, like Harlow Shapley most tended to share in greater or lesser degree Bush’s predilection for a National Science Foundation insulated from political control. And in the postwar years their traditional concern for freedom in science was strengthened by the memory of Hitler’s oppression, not to mention the current specter of Stalinism.3

In the final legislative compromise, the nation’s scientists won a victory for political elitism. As they conceded it had to after 1947, the law empowered the President to appoint the director of the National Science Foundation, but it also provided for the director to share control of policy with Bush’s part-time private board. For the most part, the members of the first board were spokesmen for the nation’s leading institutions of academic and industrial science. When the board first met early in 1951, it declared that the principal function of the Foundation was to advance basic scientific research and training, and that alone. It soon also endorsed Waterman’s determination to avoid the tangled


3 Shapley’s Committee for a National Science Foundation went no further on the control issue than to call for a compromise on the question of a board vs. a single administrator. Committee press release, Dec. 28, 1945, OWMIR, Box 375, Legislation ... Scientific. Shapley himself was willing to go along with a division of responsibility between a part-time board and a presidentially appointed administrator. While an Inter-Society Committee for a Foundation opted for a presidentially controlled agency, the vast majority of its members were drawn from the affiliated scientific societies of the American Association for the Advancement of Science, most of which were in the life and social sciences. Fred D. Schultze to Carey, Dec. 1, 1947, BOB, series 1933, file 91; Lomax, A Minor Miracle, pp. 52–53.

4 The vice-chairman was the biochemist Derle W. Bronsk, the new president of the Johns Hopkins University. Jowett’s successor is head of the National Academy of Sciences, and a forceful advocate of Bush’s views. The chairman was Conant, who had defended Bush’s program and attacked Kilgore’s: “There is only one proven method of assisting the advancement of pure science—that of picking men of genius, backing them heavily and leaving them to direct themselves.” Conant to the Editor, New York Times, Aug. 3, 1945 (published Aug. 10). ORR, Entry 2, President’s Letter, Nov. 17, 1944. Lomax, A Minor Miracle, pp. 72–73; Schultze to Holst, Dec. 18, 1940; National Science Board, press release, Feb. 15, 1951, BOB, series 1933, unit 94.

5 The clause was the work of William D. Carey in the Budget Bureau. Eager to temper Bush’s best-science propensity for “putting the money where it will produce the most efficient research,” Carey had argued that the Foundation should not only he limited to avoid the geographical concentration of its large; it should also be told actively to broaden the “research base of the Nation instead of feeding the ‘fat cats’ who are most likely to come up with the best answers.” Carey to Staats, Jan. 14, 1949, BOB, series 3932, file E8-21/481.1.
their society and government. Now, through the Office of Naval Research, the Atomic Energy Commission, and the National Science Foundation, they were supplied with what they had been seeking for the better part of a century—a system of federal support for basic research and training insulated from political control and focused on the advancement of the best possible physics.

XXIII

The Physicists Established

In 1950 the new journal Physics Today was warmed to note: “The springtime of Big Physics has arrived.”

The Los Alamos generation had come out of World War II disposed to think big—and expensively. Now federal money was flowing almost as freely as during the war, and the nation’s leading scientists enjoyed considerable say about how the research dollars were to be spent. On the advice of physicists, the Atomic Energy Commission transformed some of its wartime research enterprises into permanent national laboratories, including Argonne, south of Chicago; Oak Ridge; and Berkeley. Argonne and Oak Ridge were to be centers of reactor research, and chain-reacting piles were prolific sources of what physicists were calling “low energy” neutrons. The Berkeley laboratory, which Ernest Lawrence wanted to make a “paradise of physics,” set its sights on experiments with high energy particles.1

During the war physicists had mastered a remarkable variety of sophisticated electronic techniques, including circuits fast enough to monitor nuclear phenomena occurring in millionths of a second. Some of the Berkeley staff were adapting outmoded radar equipment to nuclear experiments, even to the acceleration of particles to energies high enough for nuclear bombardment. But what most excited Lawrence was the

1 Physics Today, Ill (July 1950), 35.