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*Political Science: The National  
Science Foundation Act of 1950*

**POLITICAL SCIENCE: THE NATIONAL SCIENCE FOUNDATION ACT OF 1950**

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## GLOSSARY OF ABBREVIATIONS

A glossary of United States national science policy agencies and their abbreviations with the date of their establishment might prove to be helpful to the reader.

AEC..... Atomic Energy Commission (1946)

NAS..... National **TABLE OF CONTENTS** (1947)

NDRC.... National Defense Research Council (1940)

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SAB..... Science Advisory Board (1958)

WPB..... War Production Agency (1942)



## THE GLOSSARY OF ABBREVIATIONS

A glossary of United States national science policy agencies and their abbreviations with the date of their establishment might prove to be helpful to the reader.

AEC..... Atomic Energy Commission (1946)  
NAS..... National Academy of Sciences (1863)  
NDRC..... National Defense Research Committee (1940)  
NRC..... National Research Council (1918)  
NRL..... Naval Research Laboratory (1923)  
NSF..... National Science Foundation (1950)  
ONR..... Office of Naval Research (1946)  
OSRD..... Office of Scientific Research and Development (1941)  
SAB..... Science Advisory Board (1933)  
WPB..... War Production Board (1942)

over the passage of the National Science Foundation Act was the proper role of the federal government in regard to the scientific community of the United States. "Political science" has been simplistically defined as who gets what, where and how. The National Science Foundation Act was to provide federal dollars to be spent in the pursuit of scientific research in the nation's universities and private laboratories. But what kind of

A. Hunter Dupree, "The History of American Science -- A Field Finds Itself," *American Historical Review* 71 (April 1964): 863, 871.



## THE SIXTY-FOUR BILLION DOLLAR QUESTION

Historian of science A. Hunter Dupree has pointed out that American civilization and modern science occupy the same span of history. "Science has become a central theme of American history in the mid-twentieth century."<sup>1</sup> Perhaps no better example for the centrality of American science to American civilization can be found than in the political history of the National Science Foundation Act of 1950. The "American Experiment" of republican democracy, from its very inception two hundred years ago, has concerned itself with the proper role of government over the lives of its citizens. The central theme of the political debate over the passage of the National Science Foundation Act was the proper role of the federal government in regard to the scientific community of the United States. "Political science" has been simplistically defined as who gets what, where and how. The National Science Foundation Act was to provide federal dollars to be spent in the pursuit of scientific research in the nation's universities and private laboratories. But what kind of

<sup>1</sup> A. Hunter Dupree, "The History of American Science -- A Field Finds Itself," American Historical Review 71 (April 1966): 863, 874.



scientific research was to be pursued, basic or applied? Which scientists and institutions would receive federal support? Most important of all, who would decide these questions, government officials, with at best little informed knowledge in scientific matters, or the scientific community, the source of informed knowledge that might well not be fully representative of the interests of American society as a whole? Such was the basis for the debate over the NSF Act of 1950.

Despite a broad consensus that American government should support American science which included the President, the Congress, and nearly all American scientists, the National Science Foundation Act generated a controversy that spanned five years of congressional debate, countless hearings, twenty-one separate NSF bills, one presidential veto and one long, hard look at the relationship between American government and American science. At stake was the political control of government-sponsored scientific research in the United States. Never before the proposed National Science Foundation Act had scientific research generated a political question of such magnitude, and, with the possible exception of the Sputnik crisis of 1957, never since the NSF Act of 1950 has scientific research and science policy so engrossed the political leadership of the United States. *Vannevar Bush, Science, the Endless Frontier: A Report to the President on a Program for Postwar Scientific Research, with an introduction by Alan T. Waterman, Director, NSF (Washington, D.C.: National Science Foundation, 1960), 12.* Until now. The late 1980's and the early 1990's have produced a rising concern over the "competitiveness" of U.S. science and technology. Lewis M. Branscomb, Director of Science, *Publications, 1968), 357, 359.*



Technology and Public Policy at Harvard's John F. Kennedy School of Government, writes,

After forty years of federal mobilization of the nation's technology to compete with its enemies in the Eastern bloc, the U.S. government is concerned about the ability of American industry to compete technologically with its friends in the West. The shift from military to commercial demands on the nation's scientific and technological base has generated a national policy debate.<sup>2</sup>

That debate of today may yet prove to be as far-reaching and influential as was the debate over the NSF Act of 1950. The National Science Foundation Act was first proposed in almost a vacuum of national science policy -- a formal science policy had yet been created. Vannevar Bush, the major proponent of the NSF Act, wrote in 1945, "Science has been in the wings. It should be brought to the center of the stage."<sup>3</sup> Scarcely twenty years after there was such a "sudden expansion and diversity of [American] science policy" that made it impossible, according to one study, "to speak of science policy in the singular in the United States".<sup>4</sup> The National Science Foundation Act of 1950 marks the beginning of current national science policy.

Today we face a myriad of science policy choices. If

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<sup>2</sup> Lewis M. Branscomb, "Toward a U.S. Technology Policy," Issues in Science and Technology 7, no.4 (Summer, 1991): 50.

<sup>3</sup> Vannevar Bush, Science, the Endless Frontier: A Report to the President on a Program for Postwar Scientific Research, with an introduction by Alan T. Waterman, Director, NSF (Washington, D.C.: Government Printing Office, 1945: repr., Washington, D.C.: National Science Foundation, 1960), 12.

<sup>4</sup> Organization for Economic Cooperation and Development, Reviews of National Science Policy: United States (Paris: OECD Publications, 1968), 357, 359.



science has become central to American history, as Dupree points out, science policy has also become central to most agencies and institutions of American government. The 1991 federal budget held proposals for basic scientific research by the National Institute of Health, the NSF, NASA and the Departments of Defense, Energy and Agriculture, totaling over twelve billion dollars. Government agencies conducting applied research and development include the above as well as the Departments of Health and Human Services, Interior, Commerce, Transportation, the EPA, the Agency for International Development and Veteran Affairs. The total U.S. outlay for scientific research and development in 1991 was sixty-four billion dollars.<sup>5</sup>

There can be no doubt that such a figure generates political controversy. "The Cold War is over," noted one presidential aspirant of 1992, "Germany and Japan won." The question now seems to be, what are we going to do about it? Science policy and the associated area of high technology is, and always has been, a political rather than scientific question. What shall decide the course of the national policy debate that Branscomb describes?

One way to shed light on this question is examine the origins of national science policy and to look at its first true debate, the controversy over the National Science Foundation Act

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<sup>5</sup> David J. Hansen, Janice B. Long, and Pamela S. Zurer, "Administration's 1992 Budget Proposes a Healthy Boost for R&D," Chemical and Engineering News, 29, no.6 (18 February 1991), 8.



of 1950. The historiography on the origins of the NSF generally casts this debate as the ideological confrontation between elitist and populist visions for the federal government's relationship with the scientific community. This approach is, of course, well grounded in similar controversies over the role of the federal government throughout American history up to the present time. There is, however, considerable disagreement whether the NSF Act of 1950 represents a victory for the elitist position of the scientific community, as Kevles asserts, or, as Greenberg holds, the final version of the NSF reflected the policies of the Truman administration, which favored the more populist vision. But both these historians generally ignore how an ideological debate between members of the scientific community and the federal government became a partisan confrontation between the Democratic and Republican parties. The political and legislative history of the National Science Foundation is well addressed by England, but his work remains uncritical of the partisan activities of one of the most prominent members of the scientific community and its leading advocate for the elitist version of the NSF, Vannevar Bush.

The origin of any public policy is a complex and multifaceted affair, involving ideological battles and political confrontations often of far greater consequence than one single individual. Yet there are times when the actions of a single key individual shapes the course of history. For the want of partisan activities of Vannevar Bush, the debate over the



National Science Foundation would have taken a different course, as well might the course of United States' national science policy today. Harry S. Truman once said that Vannevar Bush, in light of his actions over the NSF, should have been a politician and not a scientist, to which Bush replied, "Mr. President, what the hell do you think I've been doing?"<sup>6</sup> In order to understand the consequences of the National Science Foundation Act of 1950 in the light of national science policy today, we must first assess the consequences of the political actions of Vannevar Bush, the country's first "political" scientist.

community's aid in the furtherance of the government's policy goals had had a long history, often arising out of similar periods of national crisis. Despite the increasing importance of science to federal policy and to society as a whole, the scientific community had long felt ill-used by the government's ad hoc approach and lack of appreciative understanding of scientific issues.

In all federal programs... science was not regarded as a thing apart, valuable in itself, but always and only as a tool for the solution of problems... Concern for science, in other words, was limited to its immediate usefulness.

The traditional relationship between government and the scientific community was marked by deep divisions, with condescension and disdain on one hand in the government, aloofness and suspicion on the other among the scientists.

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<sup>6</sup> Milton Lomask, A Minor Miracle: An Informal History of the National Science Foundation (Washington, D.C.: National Science Foundation, 1975), 62.



Efforts to promote a science policy in the national defense began in World War I. The National Research Council was established by Woodrow Wilson in 1918 as a war-time expedient.

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#### PRELUDE TO FOUNDATION: THE WAR YEARS

The proposals for a National Science Foundation grew out of the task of organizing the United States' scientific and technological resources in the country's defense during the second World War. Yet efforts to enlist the scientific community's aid in the furtherance of the government's policy goals had had a long history, often arising out of similar periods of national crisis. Despite the increasing importance of science to federal policy and to society as a whole, the scientific community had long felt ill-used by the government's ad hoc approach and lack of appreciative understanding of scientific issues.

In all federal programs.... science was not regarded as a thing apart, valuable in itself, but always and only as a tool for the solution of problems.... Concern for science, in other words, was limited to its immediate usefulness.<sup>7</sup>

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<sup>7</sup> J. Stefan Dupre and Sanford A. Lakoff, Science and the Nation: Policy and Politics, (Englewood Cliffs, NJ: Prentice Hall, Inc., 1962), 6.



Efforts to promote a science policy in the national defense began in World War I. The National Research Council was established by Woodrow Wilson in 1918 as a war-time expedient. The NRC, instituted to coordinate the work of scientists both in and out of government, and to conduct research in its own labs, proved to be a long-range failure. No basic realignment of interests occurred between the scientific community and the national government.<sup>8</sup> The NRC failed because its institutional role was too great for its bureaucratic means. The National Research Council, like its parent organization, the National Academy of Sciences, was primarily a consultive and advisory body, not an executive one. It could provide scientific information to the government, but could not initiate any policy on its own, nor could it implement any of its findings. It was autonomous in that it was free from government control, something which scientists held that the nature of their work demanded, but it was powerless in directing any nascent science policy. Scientists would have to gain both autonomy and authority in order to be as effective a part of the national defense as they had the potential to be.

The relationship between the scientific community and the federal government underwent dramatic changes during the years between the first and second World Wars. Though the

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<sup>8</sup> Pursell, "Science and Government Agencies", 237.

<sup>8</sup> Carroll W. Pursell, "Science and Government Agencies", in Science and Society in the United States, eds. David D. Van Tassel and Michael G. Hall (Homewood, IL: The Dorsey Press, 1966), 240.



effectiveness of the NRC suffered from the traditional antipathy between scientists and government, its establishment did help initiate a thaw in their chilly relationship. The Naval Research Laboratory, for the most part foisted upon and ignored by the military after its establishment in 1923, still managed to do important scientific work, notably in the development of radar.<sup>9</sup> Secretary of Commerce and later President Herbert Hoover did much to bring the scientific community and government closer together, if only by means of his own unique position as both the government's highest official and a member of the NAS. Scientists were disappointed, however, in Hoover's failure to get Congress to pass legislation for his National Research Fund, financed by private industry and administered by the NRC.<sup>10</sup> The Depression fostered a swifter pace for the reconciliation between the scientific community and government.

The threat of unwise economy measures and the promise of new opportunities through emergency programs led to several attempts by civilian scientists to organize some central agency for the guidance of the government in scientific matters. The National Academy and Research Council were... found wanting in the emergency.<sup>11</sup>

Like a number of New Deal attempts to confront the nation's crisis, the Science Advisory Board of 1933 and the National Resources Board's Science Committee of 1935 never quite got off the ground. But the importance of these attempts to establish

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<sup>9</sup> Pursell, "Science and Government Agencies", 237.

<sup>10</sup> Ibid., 238.

<sup>11</sup> Ibid., 239.



some sort of science policy mechanism in the national government between the wars should not be underestimated. Such efforts recast the old patterns of scientific organization, support and relationship with government. They pointed out the need for a supra-bureaucratic coordination in addressing science policy issues and provided experience for a new generation of scientific and governmental administrators.<sup>12</sup> Such developments would become explicit during WWII. Yet as much as government was rethinking its relationship with the scientific community during this period, political and scientific events in Europe led many American scientists to rethink their relationship with their government.

The scientific community in the United States had long been most internationalist in its outlook, even while the rest of the nation was wrapped in the isolationist rhetoric left behind from the previous war. This outlook was supplemented by the arrival in America of a large number of leading European scientists fleeing the rising tide of Fascism in Italy and Germany. These emigre scientists, Edward Teller, Leo Szilard, and Enrico Fermi among them, as well as American physicists, noted with both excitement and alarm the new developments in nuclear physics occurring in Germany. The recent emigres came from a European tradition in which the relationships between the scientific communities and their respective governments were not as distant

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<sup>12</sup> Ibid., 240.



and strained as they were in the United States. They among others persuaded America's most notable political refugee and titular head of its scientific community, Albert Einstein, to lend his name to a letter to Franklin Roosevelt describing the possible military applications of new research in atomic energy. That such a noted pacifist would undertake such an action is an indication of a profound change in the traditional relationship between the scientific community and government in the United States. Einstein's letter of August 2, 1939, did not ask for institutional leadership on the government's part in the manner of the old National Research Council, but instead merely asked that Roosevelt expedite current American research being presently conducted in university laboratories by helping to provide any additional funding, if needed, and securing the cooperation of industrial laboratories which had the necessary equipment.<sup>13</sup> Einstein's simple request in a sense predicted both the means and the outcome of America's scientific and technological efforts in WWII. Scientific and technological aid would be enlisted in the nation's defense during WWII at an operational level, leaving scientists "in situ" in their own laboratories and universities rather than enjoining them to work in such institutional structures such as the failed NRC, and such aid would culminate in the development of the atomic bomb.

However, Einstein's letter was not the catalyst needed for

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<sup>13</sup> Daniel S. Greenberg, The Politics of Pure Science, (New York: The New American Library, Inc., 1967), 74.



such developments, though popular opinion often holds it to be. Roosevelt's reaction to it was less than decisive: he appointed a committee to study the matter. Under the guidance of the director of the National Bureau of Standards, Lyman J. Briggs, and composed of ordinance experts from the Army and Navy, the Advisory Committee on Uranium was a disaster. Fermi and others had previously tried to interest the Naval Research Laboratory in the possibility of nuclear power, but to no avail. The point of Einstein's letter was to bypass such small-scale bureaucratic review by government officials who might not fathom the importance of recent developments. In November of 1939, the Briggs Committee reported to the President that the military application of atomic energy "must be regarded as only a possibility", and was awarded the princely sum of \$6,000 to further study the matter.<sup>14</sup> Clearly, stronger measures had to be taken to develop atomic weapons or to produce a science policy that would effectively serve in the nation's defense. The architect of those stronger measures as well as the later major proponent for the Nation Science Foundation was Vannevar Bush. An electrical engineer and pioneer in computer design, Bush held impeccable academic credentials as the former vice-president of the prestigious Massachusetts Institute of Technology. In 1933 he became the president of the Carnegie Institution of Washington, perhaps the premier non-academic

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid., 75.



scientific research organization in the country. In 1939, Bush assumed the chairmanship of the National Advisory Committee for Aeronautics, or NACA, one of the few government scientific agencies that managed to do notable work, mostly through its practice of letting out research contracts to academic and non-military scientists. A veteran of the NRC and a Navy reserve officer with ties to the Naval Research Lab, Bush had also served on a committee under the Science Advisory Board some years earlier. If it can be said that there was an "establishment" in the scientific community in the United States prior to WWII, Vannevar Bush must be accorded a leading place in its ranks.<sup>15</sup> Bush's wide experience gave him invaluable credence in governmental, scientific and military circles. He would embody in one person nearly the entire science policy of the United States during WWII. It was almost as if he were tailor-made for the role he would assume. "I was in Washington, I knew government, and I knew the ropes. And I knew that the United States was asleep on the technical end."<sup>16</sup> Meanwhile, the sleepy Briggs Committee had run out of money.

In May of 1940, FDR's confidant and Secretary of Commerce Harry Hopkins was seeking ways to mobilize the country's technical genius in the face of the coming war. By the end of the next month, Hopkins, who had met Bush through his work at

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<sup>15</sup> Ibid.

<sup>16</sup> Greenberg, *The Politics of Pure Science*, 79. Kevles, *The*

<sup>16</sup> Ibid., 76.



NACA, conducted him to the Oval Office, where FDR affixed his initials to Bush's plan for a new government science agency, to be called the National Defense Research Committee.<sup>17</sup> Bush's NDRC was modeled from his experience with the NACA, a government-funded agency reporting directly to the president and not to the NRC of the NAS. His plan for the NDRC represented a departure from the National Academy of Sciences' traditional fear of political control over scientific research, but Bush intended the NDRC to last only for the duration of the war. He had as well stacked its membership with enough members of the NAS, including both himself as chairman and the Academy's president, Frank Jewett, to allow the new NDRC to forestall any political control of the scientific community.<sup>18</sup> So instead of scientists working for government dollars, as they had under the NRC, government dollars could now work for scientists. The NDRC provided the administrative apparatus that granted what many in the scientific community had long hoped for: both political autonomy and political authority over science policy, along with adequate financial support from the President's emergency funds.<sup>19</sup> The NDRC could conduct scientific research as it saw fit and, tucked under the wing of a powerful and sympathetic president, was safe working in concert with Bush in the NDRC, produced a report in

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<sup>17</sup> Daniel J. Kevles, The Physicists: The History of a Scientific Community in Modern America, (New York: Alfred A. Knopf, 1978), 297.

<sup>18</sup> Ibid., 296.

<sup>19</sup> Greenberg, The Politics of Pure Science, 79. Kevles, The Physicists, 297.



from most political control. The scientific community as led by Bush hit the ground running to prepare for the coming war. By December of 1940, the NDRC authorized 126 research contracts to scientists working in their own laboratories and own institutions, mostly on problems of their own choosing.<sup>20</sup> Science and government had finally found a way to cooperate.

Meanwhile, the problem of the starving Briggs Committee remained to be solved. Briggs had written Bush at the Carnegie Institution in June of 1940 to ask for \$1,000 "to cover traveling expenses ... telephone calls and similar items."<sup>21</sup> This was the type of snafu that had long enraged America's scientific community and caused it to hold the government's scientific efforts in low repute. While Bush had been previously unable to enlist the Carnegie's support for atomic research, his new position as the chairman of the NDRC would allow him to take over the entire project. Being no stranger to the byzantine, if not bureaucratic maneuvering needed to conduct any policy in Washington, and since the National Academy of Sciences was still the formal advisor to the government on scientific matters, Bush persuaded Briggs to allow the NAS to review the findings of the Advisory Committee on Uranium. The Academy, its leadership working in concert with Bush in the NDRC, produced a report in the fall of 1941 based on new research that the Briggs Committee

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<sup>20</sup> Kevles, The Physicists, 298.

<sup>21</sup> Greenberg, The Politics of Pure Science, 77.



had not reviewed, speaking of a "fission bomb of superlatively destructive power."<sup>22</sup> This finding effectively panned the Briggs Committee's previous efforts. By the time such a report came out, Bush's NDRC had been subsumed in a larger organization of his own devising, the Office of Scientific Research and Development.

The OSRD was Bush's next step in assuming nearly all control of America's war-time science effort. The NDRC had rapidly outgrown the President's use of discretionary emergency funds, and while it could conduct research of its own accord, it could not authorize the development of production-ready prototypes of new technology based on its work. That task was left to a bureaucratically jealous and still recalcitrant military. The head of Army Ordinance had no doubts about the proper role of the NDRC -- it was to do the bidding of the Army and the Navy, just as the old NRC had been supposed to do.<sup>23</sup> With the NAS report on the feasibility atomic weapons out, the question now was, if an atomic bomb could be built, would it be? Men and morale, it was held by many among the military, won wars, not new weapons.<sup>24</sup>

Such an attitude could yet reduce an atomic weapon to a flash in the pan.

By May of 1941, the Bureau of the Budget had requested a report on the organization of defense science. The inquiry led

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<sup>22</sup> Ibid., 83.

<sup>23</sup> Kevles, The Physicists, 299.

<sup>24</sup> Greenberg, The Politics of Pure Science, 75.



to another executive order, probably written by Bush himself, establishing the new OSRD with Bush as its director. Bush had become, in the words of the New York Times, the nation's "czar of research", reporting directly to the president, with the OSRD controlling the production of industrial prototypes of new military technology and holding direct funding from the Congress.<sup>25</sup>

The scientists had triumphed. The OSRD was a political landmark for the nation's scientific enterprise. For the first time in the nation's history, substantial federal funds were going to university laboratories. Furthermore, while [these] contract[s] [were] designed to reconcile freedom with accountability, [they were] clearly weighted toward freedom.<sup>26</sup>

As for the problematic Briggs Committee, it was eventually disbanded and its work taken up by Bush's cadre of like-minded scientists now firmly ensconced in Washington. It was the OSRD that established the secret Manhattan District which, as it is well known, built the Bomb.

I.I. Rabi, Nobel laureate and later presidential science advisor, said some twenty years after the war:

Bush did a very great thing just by setting up an organization in which it was possible for a scientist to make military contributions with dignity and effectiveness.<sup>27</sup>

Bush's role as the leading representative of the scientific community and the main architect of science policy during WWII

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<sup>25</sup> Kevles, The Physicists, 295.

<sup>25</sup> Kevles, The Physicists, 299-300.

<sup>26</sup> Greenberg, The Politics of Pure Science, 80.

<sup>27</sup> Ibid., 68.



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left a somewhat mixed legacy for the post-war period. There can be no doubt of the importance of the vast and unparalleled efforts of Bush's OSRD in terms of manpower, spending and achievement during the war. The traditional antipathy between scientists and government had been overcome. The development of the Bomb was the most important of many scientific and technological break-throughs brought about by the scientific community during WWII. Decisive as Bush's actions were in the course of developing an effective war-time science policy, Bush was as well personally abrasive, autocratic, disdainful of those he thought knew less than him, deeply conservative and thoroughly Republican.<sup>28</sup> He was, in many ways, typical of the popular conception of scientists as well as the epitome of what scientific leadership could do on the behalf of the country. With Bush's leadership in shepherding what would become the Manhattan Project, and his skill at fending off other subsequent bureaucratic and congressional challenges to his OSRD, the scientific community could well conclude that theirs was the indispensable ingredient of the American triumph.<sup>29</sup> But if the cataclysmic end to World War II proved nothing else, it proved that war had become too important to be left for the generals,

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<sup>28</sup> Kevles, The Physicists, 295.

<sup>29</sup> Carroll W. Pursell, "Science Agencies in World War II: The OSRD and Its Challengers," in The Sciences in the American Context: New Perspectives, ed. Nathan Reingold, (Washington, D.C.: Smithsonian Institution Press, 1979), 359-378. Greenberg, The Politics of Pure Science, 83.



and science had become too important to be left to the scientists. The federal government would, in the post-war period, re-examine its wildly successful science policy, not in the light of war-time expedience, but in the light of its constitutional role to promote the common welfare as well as to provide for the common defense. Though political controversy had been put aside for the duration of the war, a battle had been long brewing. The federal government's spending on scientific research and development had increased ten-fold in the years from 1938 to 1944, to nearly three-quarters of a billion dollars, according to Senator Harley Kilgore's Subcommittee on War Mobilization, which didn't even know about the millions poured into the Manhattan Project until after Hiroshima and Nagasaki.<sup>30</sup> The control of such a bonanza had been placed squarely in the hands of Vannevar Bush and his colleagues, the elite of America's scientific community drawn from Harvard, M.I.T., Columbia, Berkeley, the University of Chicago and A.T.&T.'s Bell Laboratories. If, as many in the scientific community felt, scientists had saved science from the government, what then would save the government, at least in terms of a post-war science policy, from this new and powerful scientific elite? "It must be undertaken into the indefinite future," said Representative Sterling Cole (R-NY), indicating the broad bipartisan

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<sup>30</sup> U.S. Congress, Senate, Subcommittee on War Mobilization, Report, "The Government's Wartime Research and Development, 1940-44; Part II. -- Findings And Recommendations," 79 Congress, 1st sess. (1945), 20-22.



congressional support that federally sponsored science had won during the war. "The question is how it can be done most effectively".<sup>30</sup> That question of how would occupy Congress, the President, Bush and the

#### THE FIRST PROPOSALS

How Bush's Science, the Endless Frontier came to be submitted (see). On July 5th of 1945, Vannevar Bush formally submitted to the new occupant of the Oval Office, Harry S. Truman, a report entitled Science, the Endless Frontier. In it was Bush's blueprint for a post-war science policy: the "National Research Foundation." The successes of the scientific community in the war effort under Bush's leadership had led to an unparalleled opportunity to shape national science policy. Bush, as director of the OSRD and leading representative of the scientific community, was to become a major voice for the post-war conversion of federally sponsored scientific research. There was no real question whether the government should support science. Of the one hundred witnesses that would testify before Congress in the early rounds of hearings on post-war science legislation, only one would speak against federally sponsored scientific research.<sup>31</sup> "We are all agreed that scientific research must be undertaken into the indefinite future," said Representative Sterling Cole (R-NY), indicating the broad bipartisan

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<sup>31</sup> U.S. Congress, House, Committee on Interstate and Foreign Commerce, Hearings, "Nation Science Foundation," 80 Cong., 1 sess. (March, 1947), 73-76. Science, the Endless Frontier, 3-4.



congressional support that federally sponsored science had won during the war. "The question is how it can be done most effectively".<sup>32</sup> That question of how would occupy Congress, the President, Bush and the scientific community for the next five years.

How Bush's Science, the Endless Frontier came to be submitted itself illustrates the political wrangling that was to come. On November 17, 1944, FDR signed a letter addressed to Bush which asked four basic questions. First, how could the government make available to the public the scientific knowledge gained by the NDRC and the OSRD during the war? Second, how could the government sponsor a similar effort in a war against disease? Third, what could the government do then and in the future to foster scientific research by public and private institutions? Fourth, in what way could the federal government aid the development and education of scientific talent so that future research would remain comparable to the level gained during the war?<sup>33</sup> These questions allowed Bush to expound on post-war science policy. Science, the Endless Frontier was Bush's reply to FDR and contained his vision on the manner and the course the country should take in regard to the scientific community in the future.

The questions in FDR's letter were in no way controversial.

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<sup>32</sup> Greenberg, The Politics of Pure Science, 104.

<sup>33</sup> Vannevar Bush, Science, the Endless Frontier, 3-4.



As noted earlier, there was a consensus that the coalition of science and government as expressed by Bush's OSRD should continue after the war, though in a different administrative form. The Office of Scientific Research and Development was, like the National Research Council before it, simply a war-time expedient. But the close cooperation between the scientific community and the federal government was not to be dropped after this war, as it had been after WWI. Events had shown that federal support of scientific inquiry was too important to be abandoned. In this light, FDR's letter seems both sensible and far-seeing. The question is, did FDR actually write such a letter?

Some authorities, such as Cal Tech's Daniel Kevles or Daniel Greenberg, formerly of Science, the official journal of the American Association for the Advancement of Science, hold that the letter's author was none other than Bush himself.<sup>34</sup> Other, more official historians of the National Science Foundation dispute this notion.<sup>35</sup> In any event, FDR's letter allowed Bush the priceless political opportunity to publicly set forth his vision for a post-war national science policy before any of his rivals could announce their own.

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<sup>34</sup> Greenberg, The Politics of Pure Science, 105. Kevles, The Physicists, 347.

<sup>35</sup> J. Merton England, A Patron For Pure Science: The National Science Foundation's Formative Years, 1945-57, (Washington D.C.: National Science Foundation, 1982), 9.



Bush did have rivals. In 1940, Secretary of Agriculture Henry A. Wallace suggested that as "Agriculture is one of the greatest scientific research agencies, I think a representative of this department might sooner or later be included on the NDRC."<sup>36</sup> Bush managed to forestall such bureaucratic imperialism, as he did similarly with Secretary of Interior Harold L. Ickes' proposal in the same year to create an office of scientific liaison under Interior's control. Bush simply turned the tables on Ickes by incorporating his suggestion in the proposal for the OSRD.<sup>37</sup> Such successful bureaucratic infighting should be expected of Bush, as members of the ill-fated Briggs Committee might well testify. In 1942, the War Production Board (WPB) was set up. Included in it was the Office of Industrial Research, whose mission, members of the OSRD thought, might intrude on their own. The WPB also wanted to modify U.S. patent policy as it applied to federally supported research, something which the industrial scientists at OSRD viewed with alarm. Bush, however concerned he may have been in principle, must have remained somewhat untroubled as he had the secret minutes of some of the WPB's committee meetings on this subject within days after they were held. Knowledge is power, and Bush knew that the potential threat from the WPB's Office of

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<sup>36</sup> Pursell, "Science Agencies in World War II," 365.

<sup>37</sup> Ibid., 368.



Production Research would never seriously affect his OSRD.<sup>38</sup>

Science, the Endless Frontier must be considered in the light of Vannevar Bush's demonstrable skill at bureaucratic maneuvering and his singular vision as to the direction of national science policy. If he did not create the opportunity to steal the thunder of his rivals in science policy, then he exploited that opportunity as if it had been tailor-made for his sole purpose. The point as to whether Bush was the actual author of FDR's letter is somewhat moot because Science, the Endless Frontier served Bush as simply another way to out-maneuver any rival. The rival Bush was gunning for this time was not another executive threat to his leadership in science policy but a congressional one. In 1942, Senator Harley Kilgore (D-W.VA) had been appointed chairman of the Senate Committee on Military Affairs' Subcommittee on War Mobilization.

Throughout the war years, [Kilgore] had been monitoring the government support of scientific and engineering projects. At the time of the establishment of the OSRD, the [Roosevelt] administration and Senator Kilgore agreed that the president should proceed.... without prior congressional approval, using his war powers, but that the OSRD would be disbanded at the end of the conflict and that Congress would have an opportunity at that time to shape any post-war organization for this purpose. Looking toward that objective, Senator Kilgore followed [the OSRD] closely and held periodic hearings throughout the war.<sup>39</sup>

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<sup>38</sup> Ibid., 372.

<sup>39</sup> Jon D. Miller, The American People and Science Policy: The Role of Public Attitudes in the Policy Process, (New York: Pergamon Press, 1983), 14.



By 1943 Kilgore was introducing science legislation with the "help" and revision of none other than Vannevar Bush, whose aid was meant to channel Kilgore's efforts rather than thwart them.<sup>40</sup> Like Harold Ickes before him, Kilgore would find his proposals for science policy co-opted by Bush.

In October of 1944, Kilgore was readying legislation for the creation of a "National Science Foundation" to sponsor basic and applied scientific research after the war ended and the OSRD was disbanded. Since Kilgore was already canvassing the scientific and engineering communities for support of his bill, and as the end of the war was in sight, it was urgent that Bush formulate his own proposal for any post-war science policy if he wanted to retain the complete control over it he had hitherto enjoyed. It is certain that he felt that he could do a better job of it than any liberal senator from West Virginia could, however well-meaning.<sup>41</sup> Even if Bush had not sent himself a letter over the ailing FDR's signature, the letter was a god-sent opportunity to seize the initiative from Kilgore and to try to create, as director of the OSRD, the new Truman administration's official position on post-war science policy. Bush's National Research Foundation and Kilgore's National Science Foundation proposals differed in far more than name only. The contending architects of post-war science policy could only

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<sup>40</sup> Pursell, "Science Agencies in World War II," 374.

<sup>41</sup> England, A Patron For Pure Science, 11.



agree that

The ... Foundation should develop and promote a national policy for scientific research and scientific education, should support basic research in nonprofit organizations, should develop scientific talent in American youth by means of scholarships and fellowships, and should by contract and otherwise support long-range research on military matters.<sup>42</sup>

While Bush and Kilgore both sought to continue the close support that the scientific community had received under the NDRC and the OSRD after such organizations would be disbanded, Representative Sterling Cole's question of how that should be done proved to be divisive. Bush's plan for the Foundation called for nine members appointed by the President and the Congress, not in any other way connected with government and serving without pay, who would themselves select the Foundation's chief executive officer.<sup>43</sup> The Foundation would be thus insulated from political considerations. Kilgore's Foundation would have a Director chosen expressly by the President with the advice and consent of the Senate, who would in turn consult with a Board consisting of the Secretaries of War, Navy, Interior, Agriculture, Commerce, Labor, the Attorney General, the head of the Federal Security Agency and eight other members who would also be chosen directly by the President.<sup>44</sup> Such a proposal raised the specter of the political control of the scientific community through federal

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<sup>42</sup> Bush, Science, the Endless Frontier, 34.

<sup>43</sup> Ibid., 35.

<sup>44</sup> U.S. Congress, Senate, Subcommittee on War Mobilization, Report, 27.



subsidy and threatened the hard-won autonomy that scientists had gained under Bush's NDRC and OSRD.

The Bush plan for the Foundation reflected a far more elitist view.

The [Foundation] ... should be composed of citizens selected only on the basis of their interest in and capacity to promote [its] work... They should be persons of broad interest in and understanding of the peculiarities of scientific research and education.<sup>45</sup>

In other words, no politicians. Scientists, who of themselves had done so much for the common defense of the nation during the war, could continue to provide for the common welfare of their own accord, with, of course, the help of federal dollars.

The differing visions over the composition of the proposed Foundation and thus the control of federally supported science was due to the dissimilar backgrounds and philosophies of their two authors. Bush, as noted before, was a member of the nation's scientific elite, and was conservative, Republican and somewhat autocratic. Kilgore, a small town lawyer turned New Deal Democrat with populist leanings, saw the proposed Foundation not as a way to continue the scientific elite's control over national science policy, however effective that might have been during the war, but as a way to diffuse scientific knowledge throughout the nation, down to the "little guy," from where he drew much of his political support. His Foundation would "promote a wide flow of scientific and technical information to industry and agriculture

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<sup>45</sup> Bush, Science, the Endless Frontier, 33.



and business, particularly small enterprises."<sup>46</sup> Bush's proposal tended to perpetuate the status quo, which had placed control of national science policy in the hands of the nation's leading universities and industrial corporations. Kilgore wanted to apply the New Deal to the scientific community. Simply put, Bush's proposed Foundation tended to emphasize what the federal government should do for science; Kilgore's tended to concentrate on what the scientific community should do for the government.

Besides contesting the primacy over post-war science policy and differing on the structure of the proposed Foundation's board, other issues divided Bush and Kilgore. Kilgore wanted to include the social sciences in the new federal largesse; Bush's plan was limited to support for the "hard" sciences. Bush's Foundation would be devoted almost exclusively to basic research, the pursuit of knowledge for its own sake. Kilgore sought to support both basic and applied research, which would, in Bush's view, place an unwanted emphasis on utility, the issue that had helped erect the traditional antipathy between science and government, only recently overcome. Kilgore favored an even geographic distribution of federal science funds to the various states in a structure similar to land-grant colleges of the Hatch Act; Bush adhered to the policy of disbursing funds to the "best" scientific institutions available, regardless of location. But perhaps the most telling detail that illuminated differences in

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<sup>46</sup> U.S. Congress, Senate, Subcommittee on War Mobilization, Report, 26.



their respective proposals for post-war science policy was the issue of patents.

Kilgore felt that the proprietary right to any new developments arising from government sponsored research resided in the funds used to support that research.

To protect the taxpayer's interest, all research and development projects financed in whole or in part by the federal government should be undertaken only upon the condition that any invention or discovery resulting therefrom would be the property of the United States. The Foundation should also be empowered to grant non-exclusive licenses to persons or organizations wishing to use such invention, discovery, patent, or patent right. No charge should be made for such licenses.<sup>47</sup>

This was a far more radical recommendation than any made by the War Production Board's Maverick Committee, the one that so alarmed the industrial and scientific interests at the OSRD and that Bush had kept such close tabs on in 1942. The rights to only one of the OSRD's scientific achievements, the industrial production of penicillin, were highly valuable. Bush's own position was that proprietary rights to new discoveries resided in the knowledge and skill of the scientists and the organizations that made them.

The success of the... Foundation in promoting scientific research in this country will depend to a very large degree upon the cooperation of organizations outside the government. In making contracts of grants to such organizations the Foundation should protect the public interest and at the same time leave the cooperating organizations with adequate freedom and incentive to conduct scientific research. The public interest will normally be adequately protected if the government receives a royalty-free license for governmental purposes under any patents resulting from work financed by the Foundation. There

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<sup>47</sup> Ibid., 29.



should be no obligation on the research institution to patent discoveries made as a result of support from the Foundation. There should certainly not be any absolute requirement that all rights in such discoveries be assigned to the government.<sup>48</sup>

Because of the emphasis he placed on the issue, the dispute over patent policy was the most likely reason that Bush stole a march on Kilgore by publicly releasing Science, the Endless Frontier before the Senator could introduce legislation proposing his own National Science Foundation. The battle lines between the populist Kilgore position and the more elitist Bush plan were clearly drawn. The fight was on.

On July 19, 1945, the same date that Science, the Endless Frontier was being publicly released, Senator Warren G. Magnuson (D.-WA) introduced legislation to create a National Research Foundation designed along the lines of the Bush proposal at the behest of Congressman Wilbur D. Mills, who had been working closely with the director of the OSRD.<sup>49</sup> The use of a freshman senator as a legislative patsy for Dr. Bush deeply angered Senator Kilgore, who felt that he and Bush were still collaborating on science policy.<sup>50</sup> The Senator from West Virginia felt himself to be "double-crossed" and was "mad as

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<sup>48</sup> Bush, Science, the Endless Frontier, 38.

<sup>49</sup> England, A Patron For Pure Science, 25.

<sup>50</sup> Milton Lomask, A Minor Miracle: An Informal history of the National Science Foundation, (Washington, D.C.: National Science Foundation, 1975), 43.



anything."<sup>51</sup> Bush, conveniently, was out of town and unavailable to Kilgore even by telephone.<sup>52</sup> Kilgore introduced his own legislation four days later. On September 6 Truman sent a message to Congress that included a request for a single federal science agency that would carry out the functions described in the Magnuson and Kilgore bills.<sup>53</sup> The new administration was in a politically awkward position. Certain elements, such as Don K. Price of the Bureau of the Budget and its director, Harold Smith, favored the Kilgore proposal as it granted the President substantial political control over post-war science policy.<sup>54</sup> But could Truman, who would point over his shoulder at FDR's portrait and say, "I'm just trying to do what he would," repudiate the former president's closest advisor on science policy? Both the structure of and the proposal for Bush's planned Foundation amounted to an end-run around presidential authority. Bush, for his own part, could simply say that his actions were those of a private citizen, as his role at the OSRD was now merely that of caretaker, winding down its operations, and in any event, did not and never had drawn a public salary for his work.<sup>55</sup> This did not

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<sup>51</sup> England, Patron for Pure Science, 25.

<sup>52</sup> Lomask, A Minor Miracle, 43.

<sup>53</sup> England, A Patron For Pure Science, 26.

<sup>54</sup> Kevles, The Physicists, 356.

<sup>55</sup> Ibid., 362.



placate Truman, who held that as long as Bush headed the OSRD he was an official member of the administration and subject to its political discipline.<sup>56</sup> Bush, with the death of FDR, had lost much of his entre to the Oval Office. The eastern Republican member of the nation's scientific elite had little in common with the plain-spoken haberdasher and political pro from Missouri. Even Bush's private affiliation with the Republican party was subject to constraint. The Magnuson maneuver had been necessary because a minority bill on science policy more in keeping with Bush's conservative and Republican sentiments would have gotten nowhere in the Democratic controlled 79th Congress. Introduction of a Republican National Science Foundation bill would have amounted to political suicide for Bush, had he helped design it. Such ambiguities between the President, his advisors, and Vannevar Bush made for a rather murky political program for the development of post-war science policy.

The joint hearings on the proposed Foundation bills would require a clearer position on the matter from the Truman administration. Bush's original report directly to the President in reply to FDR's letter had been able to bypass the Bureau of the Budget. With official legislation pending, Budget Director Smith now had the opportunity to voice objections to Bush's Foundation as expressed by the Magnuson bill.<sup>57</sup> While Bush was

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<sup>56</sup> Ibid.

<sup>57</sup> England, A Patron For Pure Science, 26.



busy explaining his position to Budget, efforts were undertaken by Kilgore's staff to write a compromise Foundation bill, without the knowledge or participation of Magnuson or his staff.<sup>58</sup>

Bush's legislative pawn was thus effectively left out in the cold even before the hearings on his bill began. Magnuson first heard of any such compromise in the Oval Office when Truman testified congratulated him on his efforts to cooperate with the more the desired Kilgore bill.<sup>59</sup> In the meantime, Senator J. William Fullbright (D.-AK) had introduced a bill to create a Bureau of Scientific Research in the Department of Commerce and run by one Representative Wilbur Mills (D.-AK) introduced in the House a bill along the lines of the original Bush proposal which duplicated the Magnuson bill.<sup>60</sup> Things were clearly getting out of control. Senator Magnuson would later remark, "After Kilgore and I put in our bills everybody got on the bandwagon."<sup>61</sup>

The Senate Joint Hearings on Science Legislation opened on October 8, 1945. Kilgore presided, flanked by Magnuson and Fullbright. Witnesses from the administration, such as Budget Director Harold Smith, tended to favor the Kilgore version of a Nation Science Foundation, especially in light of its political

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<sup>58</sup> Ibid. U.S. Congress, Senate, Subcommittee of the Committee on Military Affairs, Hearings, "Hearings on Science Legislation," 79 Cong. 1 sess. (Oct.-Nov., 1945), 103-105.

<sup>59</sup> Ibid., 28.

<sup>60</sup> England, A Patron For Pure Science, 28. Dorothy Schaffter, The National Science Foundation, (New York: Frederick A. Praeger, 1969), 10.

<sup>61</sup> Lomask, A Minor Miracle, 45.



responsiveness to the President.<sup>62</sup> Witnesses from the scientific community, such as James B. Conant, President of Harvard and head of the NDRC after Bush, favored the Magnuson bill.<sup>63</sup> The Magnuson-Bush proposal for the structure of the Foundation's board held deep appeal for the scientific community. Karl Compton, Bush's former mentor and President of M.I.T. testified that, "By long experience I have come to have great faith in the combined judgement, knowledge, and wisdom of a small competent group, greater faith than in the ultimate decision by one individual."<sup>64</sup> The fact that the OSRD was essentially run by one man, Vannevar Bush, raised no demurral. Faced with the political control of government sponsored science by the inclusion of ex officio members of the Foundation's board as in the Kilgore plan, the scientific community sought protection under their own collective leadership as proposed in Bush's. Where many led, no one could dominate.<sup>65</sup>

For administration witnesses, the issue was not so much control but accountability. Authority over science policy may have been abdicated to the scientific community as a war-time expedient, but the proposed Foundation was to create a peace-time

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<sup>62</sup> U.S. Congress, Senate, Subcommittee of the Committee on Military Affairs, Hearings, "Hearings on Science Legislation," 79 Cong., 1 sess. (Oct.-Nov., 1945), 103-105.

<sup>63</sup> Ibid., 982.

<sup>64</sup> Ibid., 628.

<sup>65</sup> Greenberg, The Politics of Pure Science, 113.



policy. Signs of resentment over the scientists usurpation of public policy were beginning to show. Bush's chickens were coming home to roost. Secretary of Interior Harold Ickes, whose authority had been successfully challenged by Bush's maneuvering for the OSRD, testified

There is always the disposition whenever a new activity of government is proposed for outsiders to rush in and say, "We are the only people competent to do this work. We are not bureaucrats," although some of them hope they will become so. "We are not politicians. You can trust us to lift this up to a higher plane and keep it there." To me that is all bunk.<sup>66</sup>

Illustrating this resentment as well was the testimony of Maury Maverick, whose War Production Board committee minutes had been clandestinely obtained by Bush. As Director of the Smaller War Plants Corporation, Maverick launched a vigorous attack of the elitist position of the scientific community. Criticizing "the superior attitude.... of these bulldozing scientists," Maverick rhetorically asked who had organized the original Academy of Sciences -- politicians. Who had appointed Vannevar Bush to the OSRD -- a politician named Franklin Roosevelt, who had appointed Maverick as well.

I get a little tired.... of some of these professors.... piously abrogating to themselves all the patriotism.... I suggest that all scientists remember there are other patriots in the world besides themselves and it would be a good idea to develop some social consciousness.<sup>67</sup>

Despite the fact that the President wanted the National

<sup>66</sup> "Hearings on Science Legislation," 342, in Greenberg, The Politics of Pure Science, 114-115.

<sup>67</sup> "Hearings on Science Legislation", 369.



Science Foundation (the joint hearings had managed to decide on the name), that it had congressional as well as scientific support, that all agreed that government support of the scientific community must continue, the result was legislative stalemate. After the hearings closed, Isaiah Bowman of Johns Hopkins University sent a telegram to President Truman's press secretary.

A tidal wave of protest by American scientists against the Kilgore has been recognized by a large and representative group which will report by open letter.... We believe that the initiative respecting legislation to implement the Bush report should be put back into [the President's] hands. The Kilgore bill makes possible political control and thereby endangers the future of scientific research so important to national security.<sup>68</sup>

Bowman's Committee Supporting the Bush Report did not change Truman's position. His reply stated that the administration's position had been voiced by Budget Director Harold Smith, who had supported the Kilgore bill.<sup>69</sup> But a National Science Foundation without the cooperation of the scientific community had become a political impossibility. Kilgore set about revising his bill, this time with the cooperation of Magnuson and Bush, introducing it the next year. Kilgore wanted a passable bill to enhance his political standing in his home state, where he was up for re-election.<sup>70</sup> The resulting compromise, S.1850, contained key

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<sup>68</sup> Bowman to Charles Ross [telegram], Nov. 23, 1945, Bowman Papers, Johns Hopkins University Library, NSF 1945-47 file, in England, A Patron For Pure Science, 37.

<sup>69</sup> England, A Patron For Pure Science, 38.

<sup>70</sup> Kevles, The Physicists, 356.



concessions on the issue of patents, but retained the office of director as a presidential, not a board, appointment.<sup>71</sup> Bush's support for the compromise indicates that his main area of concern had not been the issue of the composition of the Foundation's board of directors, though important, which had so engaged the Bowman Committee, but that his real worry all along had been the stifling of incentive that would have resulted in Kilgore's original patent policy. Bush believed "that S. 1850 as it stands is not at all bad considering where [it] started from."<sup>72</sup>

The Kilgore-Magnuson bill did not end all legislative problems for the proposed Nation Science Foundation. Other NSF bills competed for congressional attention and the Bowman Committee kept up the pressure on the issue of political control. The issue which had been an ideological difference a Democratic administration and the scientific community would now become a political one between Democrats and Republicans. Six of seven Republicans on the Senate Committee for Military Affairs stated that the National Science Foundation Act as proposed in the Kilgore-Magnuson compromise represented a clear philosophy of centralization and control of science through a bureaucratic autocracy. Its director would become one of the most powerful men in the country and a large sector of the economy would come

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<sup>71</sup> England, A Patron For Pure Science, 40-42.

<sup>72</sup> Ibid., 47.



under Washington's control.<sup>73</sup> They withdrew their support of the compromise, which had been previously favorably reported by the Senate Committee, in favor of southern Democrat Mills's proposed measure, which duplicated the proposal of Science, the Endless Frontier. The scientific community, whose support of the Kilgore-Magnuson compromise had been expressed by the American Association for the Advancement of Science's (AAAS) endorsement of S.1850, began to split between the Republican and Democratic positions.<sup>74</sup> The split was led by Republican Vannevar Bush, who abandoned the compromise bill he had worked on with Kilgore and Magnuson for the Mills bill, which had gained the minority party's support. Following Bush were the conservative scientists of the Bowman Committee to Support the Bush Report. Bush labeled the Mills bill "an excellently drawn piece of legislation" that would "fulfill the needs of the country better than any.... [he] had seen for the purpose."<sup>75</sup> The proposed National Science Foundation, always political, had become partisan. Faced with a fractious scientific community and anxious to return home to campaign in the coming election, Representative Mills declared that the issues that divided his and the compromise bill were too great to be quickly resolved.<sup>76</sup> All NSF bills, including the

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<sup>73</sup> Ibid., 48.

<sup>74</sup> Ibid., 57.

<sup>75</sup> Ibid., 47.

<sup>76</sup> Kevles, The Physicists, 357.



compromise, died in committee on July 19th, 1946, when the 79th congress adjourned.

#### VETO AND FINAL FOUNDATION

On August 2nd, 1946, just shy of the Atomic Age's first birthday and seven years after Einstein's letter, the president of the American Association for the Advancement of Science, Howard A. Meyerhoff, published an "obituary" of the NSF Act in the AAAS's Science Magazine, calling the measure's death a "homicide." Attacking the political activities of Vannevar Bush in all but name, Meyerhoff stated that the responsibility for the NSF's demise in the 79th Congress

must be placed upon the shoulders of those who drafted and introduced the Mills bill.... Let no one be so naive as to suppose that this was Representative Mills. But regardless of the motives which prompted the introduction.... it was [a] unilateral action betraying the democratic principles upon which the compromises in S.1850 were worked out in conference. Every scientist has the right to his convictions, but no scientist -- group of scientists, whether a majority or a minority -- has the right to impose its convictions at this cost. The moral of 19 July is clear: only in a reasonable show of unity, achieved by some compromise, can scientists expect political results."

Unfortunately, that spirit of compromise would be noticeably lacking in the Republican controlled 80th Congress which convened in January of 1947.

<sup>77</sup> Howard A. Meyerhoff, "Obituary: National Science Foundation, 1946," Science 104, no. 2692 (2 August 1946), 97-99.



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<sup>77</sup> Howard A. Meyerhoff, "Obituary: National Science Foundation, 1946," Science 104, no.2692 (2 August 1946), 97-98.



President Truman's troubles with the 80th Congress are well known. So decisively had the Truman-led Democratic Party been repudiated in the first post-war election that its defeat prompted Dixiecrat Senator J. William Fullbright, who had co-chaired the Joint Hearings in 1945, to suggest that Truman resign in favor of a Republican. Henceforward the President referred to the Senator from Arkansas as Senator Half-bright.<sup>78</sup> Divided government came to characterize American democracy and Truman vetoed more measures than any two-term predecessor.<sup>79</sup> One of the bills he vetoed was the first NSF Act to pass both houses of Congress.

It is ironic that the one Republican who had not signed the minority report which scuttled the Kilgore-Magnuson compromise was to introduce the bill Truman rejected.<sup>80</sup> The National Science Foundation of Senator J. Alexander Smith (R.-NJ) was to be composed of forty-eight members (later amended to twenty-four) who would elect an executive committee of nine, who would in turn select the Foundation's director. Its insulation from political control, from presidential appointment or removal, was in line with the original Bush report, which it followed on all other major provisions, including patents. The bill, S.526, was co-

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<sup>78</sup> William E. Leuchtenburg, A Troubled Feast: American Society Since 1945, updt. ed., (Glenview, IL: Scott, Foresman and Company, 1983), 15.

<sup>79</sup> Ibid., 21.

<sup>80</sup> England, A Patron For Pure Science, 48.



sponsored by Democratic Senators Magnuson and "Half-Bright."<sup>81</sup> The Kilgore-Magnuson compromise, S.1850, was re-introduced to the Senate by Elbert D. Thomas (D.-UT) as S.525 the same day that the Smith bill appeared.<sup>82</sup> With the introduction of yet a third bill in the first session of the "do-nothing 80th Congress," which Truman would later campaign against in his whistle-stop tour in the next election, Congress was assiduously at work with national science policy legislation.

Even without a Foundation bill to its credit, the Truman administration had been busy as well with science policy, though with mixed results. In 1945, the Office of Naval Research (ONR) was established by executive order. Within a year it was spending 24 million dollars in 177 research contracts with 81 different universities and laboratories.<sup>83</sup> The Navy, once excluded from most of the scientific bonanza by Bush's OSRD placement of the Manhattan project under Army control, was getting its revenge. The ONR gained permanent status from Congress in 1946, removing some of the urgency attached to the consideration of a NSF bill. In July of that year, Congress passed as well the Atomic Energy Commission Act, which gave the military a significant voice in the hoped for civilian control of

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<sup>81</sup> Ibid., 69.

<sup>82</sup> Lomask, A Minor Miracle, 49.

<sup>83</sup> Kevles, The Physicists, 355.



America's nuclear energy program.<sup>84</sup> The military's gains over science policy were somewhat muddled by Truman's establishment in 1946 of the President's Scientific Research Board (PSRB), under the chairmanship of John Steelman. Vannevar Bush, though appointed to the board as Director of the OSRD, saw his informal position as the administration's science advisor undermined by the appointment of Steelman.<sup>85</sup> Not only passed over by Truman, he had not been consulted on Steelman's selection, nor had he even been consulted beforehand on the PSRB's creation.

With Steelman's rise, Bush began to lose what little authority he ever had over the administration's position on the NSF, his "baby," a "personal matter" subject to "great feeling."<sup>86</sup> When Truman later asked for a report on post-war science policy, he turned not to Bush as FDR had, but to Steelman. The Steelman Report, unfortunately only issued after Truman's veto, voiced the administration's position

That a National Science Foundation be established to make grants in support of basic research, with a director appointed by and responsible to the President. The director should be advised by a part-time board of eminent scientists and educators, half to be drawn from outside the federal government and half from within it.<sup>87</sup>

Bush would no longer speak for the Truman administration, a fact

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<sup>84</sup> Ibid., 351-352.

<sup>85</sup> England, A Patron For Pure Science, 62-63.

<sup>86</sup> Kevles, The Physicists, 363.

<sup>87</sup> John R. Steelman, Science and Public Policy, Vol.1, "A Program for the Nation," (Washington, D.C.: Government Printing Office, 1947), 61.



with which he prefaced his testimony before the House in favor of the Smith bill.<sup>88</sup> Bush's frustrations may have led to the severe head-aches he had recently developed, originally diagnosed as a brain tumor.<sup>89</sup> Unfortunately for the administration, he gave them as well.

With so much activity in Congress and by the Truman administration it is ironic that the scientific community played so marginal a role in the formulation of the Smith bill. After the July, 1946, debacle involving the proposed NSF, the American Association for the Advancement of Science formed its Inter-Society Committee for the National Science Foundation later the same year.<sup>90</sup> Composed of two representatives each of the AAAS's nearly seventy-five affiliated societies, the Inter-Society Committee was a broad front formed to prevent the type of internal divisions in the scientific community which had caused the Kilgore-Magnuson compromise to fail. As such, it was a direct challenge to Vannevar Bush's leadership of the scientific community. Bush, who no longer spoke for the administration, no longer spoke for the scientists either. While he did not try to block the formation of the Committee -- his critic Meyerhoff's continued prominence in the AAAS prevented that and the inclusion

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<sup>88</sup> U.S. Congress, House, Committee on Interstate and Foreign Commerce, Hearings, "Hearings on Science Legislation," (7 March 1947), reprinted in Science 105, n.2725, (21 March 1947), 302-305.

<sup>89</sup> Kevles, The Physicists, 363n.

<sup>90</sup> England, A Patron For Pure Science, 64-65.



of members of the Bowman Committee may have mitigated his resistance -- neither did he subscribe to its recommendations.<sup>91</sup>

Those recommendations repudiated most of the Bush position on the proposed NSF, especially with regards to the composition of the Foundation's board and the political control of its director. The Inter-Society Committee voted two to one in favor of a presidentially appointed director over the large-board administration supported by Bush in the Smith bill then pending.<sup>92</sup> Bush, whose prominence had been established as an informal representative of the scientific community to the White House, who had represented the FDR administration's position on science policy during the war, was not only losing that role under the Truman administration but had now lost his original constituency as well. He now spoke only for himself, even though the Inter-Society Committee voted ninety-four per cent in favor of the original Bush position on the troubling issue of patent policy.<sup>93</sup> The initiative Bush had sought to seize from the Democratic Senator from West Virginia passed not to himself, as Director of the OSRD and Truman's science advisor, nor to him as the leading representative of the scientific community, but to the majority leadership of the Republican controlled 80th

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<sup>91</sup> Ibid., 365.

<sup>92</sup> Dael Wolfle, "Inter-Society Committee for a Nation Science Foundation: Report for 1947," Science 106, n.2762, (5 December 1947), 529-533.

<sup>93</sup> "Notes and News," Science 105, n.2725, (21 March 1947), 310.  
"Notes and News," Science 105, n.2726, (28 March 1947), 332.



Congress.

If Bush ignored the Inter-Society Committee's findings, so did the majority leadership of Congress. The Committee had invited the various sponsors of NSF legislation to attend their proceedings, but only one, Senator Thomas, who had re-introduced the old Kilgore-Magnuson compromise bill, showed up.<sup>94</sup> Congress was, however, well aware of the Inter-Society poll of its members favoring a presidentially appointed director; the results had been published in the Washington Post.<sup>95</sup> But in his testimony before the House Committee on Interstate and Foreign Commerce which was considering the Smith bill and resurrected Kilgore-Magnuson compromise, Chairman Edmund E. Day of the Inter-Society Committee, trying not to ignite another partisan battle, simply endorsed both of the two bills. The Committee later noted that

The primary objective of the Inter-Society Committee was to secure a National Science Foundation. Perhaps the honest objectivity of its reports and recommendations was politically naive and tactically bad. Its real desire for peace may have inhibited stronger action.... The Congressmen most directly responsible for science legislation appeared to attach much less importance to the views of a two-thirds majority of scientists than they did to those of a few particularly prominent ones. The prestige of a few names was used to support [the Smith bill] and to rebuff any suggestions for change.<sup>96</sup>

Leading among those "a few names" was that of Vannevar Bush, a Republican testifying in favor of a Republican bill before a

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<sup>94</sup> England, A Patron For Pure Science, 65.

<sup>95</sup> Ibid.

<sup>96</sup> Wolfle, "Inter-Society Committee Report," 532-533.



Republican controlled Congress.

Faced with the reluctance of the Inter-Society Committee to initiate any sort of confrontation similar to the debacle of 1946, Senator Thomas was placed in an awkward position. With no concerted support on the part of the scientific community for his sponsorship of the original Kilgore-Magnuson compromise, and presented with the still ambiguous role of Republican Vannevar Bush in the Democratic Truman administration, the minority Democrat signed the majority Republican report favoring the Smith bill.<sup>97</sup> Without a minority report advocating the Truman administration's position on the NSF, the Republican majority had a political carte blanche. Efforts by Kilgore and even Magnuson to amend the Smith bill with a provision for the presidential appointment of the Foundation's director failed along party lines.<sup>98</sup> When the final version of the Smith bill came before the Senate in May of 1947, the National Science Foundation Act was overwhelmingly passed with bipartisan support, seventy-nine to eight.<sup>99</sup> Truman's probable answer to the critical question of how the federal government should support scientific research had been ignored. The House passed the Smith bill in July and in August Truman pocket vetoed it.

Although the Steelman report would later make the

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<sup>100</sup> Truman to Smith, Aug. 7, 1947, in England, A Patron For

<sup>97</sup> England, A Patron For Pure Science, 70.

<sup>98</sup> Ibid., 75-76.

<sup>99</sup> Ibid., 76.



administration's position on the political control of the proposed NSF's director perfectly clear, Truman's opposition to the Smith bill was well known to its author.

As I told you when you discussed the matter with me, if you sent me an unworkable bill I could not sign it.... I regret very much that you couldn't see your way clear to discuss the matter further with me before it came to the stage where I had to disapprove it.<sup>100</sup>

A minority report before Congress favoring the Thomas version of the original compromise would have enhanced the Truman position on the NSF in Congress, but it was not to be due to the scientific community's unwillingness to play politics. Though not obligated to explain his reasons for pocketing the Smith bill, Truman conveyed his misgivings in a letter to Congress.

This bill contains provisions which represent such a marked departure from sound principles for the administration of public affairs that I cannot give it my approval. It would in effect invest the determination of vital national policies, the expenditure of large public funds, and the administration of important governmental functions in a group of individuals who would be essentially private citizens. The proposed National Science Foundation would be divorced from control by the people to an extent that implies a distinct lack of faith in democratic principles.<sup>101</sup>

With such a clear statement from the President, no Republican led over-ride was planned. The most elitist aspects of the Bush program for the National Science Foundation had been at last

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<sup>100</sup> Truman to Smith, Aug. 7, 1947, in England, A Patron For Pure Science, 82.

<sup>101</sup> Truman to Congress, Congressional Record, "Appendix," (15 Aug., 1947), A4442, in James L. Pennick et al., eds., The Politics of American Science: 1939 to the Present, (Chicago: Rand McNally & Company, 1965), 87.



repudiated. The Truman administration had won a legislative battle, but the populist Kilgore position would lose the political war.

Further action taken on the proposed National Science Foundation in the second session of the 80th Congress was stalled by the political battles of a presidential election year.<sup>102</sup> Senate Majority Leader Robert Taft (R.-IL.), "Mr. Republican," was well disposed to wait for the 81st Congress of the coming 1948 elections, when Truman was expected to be defeated and divided government would end. This, of course, did not happen. But the changes in the political climate from when the NSF was first proposed in 1945 to when its final version was enacted in 1950 had a profound effect. The National Science Foundation was only ancillary to Truman's Fair Deal program and as such did not become an important legislative priority.<sup>103</sup> In the intervening years, China had been "lost," the Cold War had begun, and Russia had gotten the Bomb. These were the events that defined the shape of post-war American society and thus its science policy. The support of academic science by the now defunct OSRD had been effectively taken over by the ONR, whose scientific research for the national defense -- now even of more concern -- was being coordinated by none other than Vannevar Bush, wearing the last of his many government hats as chairman of the Joint Research and

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<sup>102</sup> England, A Patron For Pure Science, 90.

<sup>103</sup> Leuchtenburg, A Troubled Feast, 19.



Development Board in the Department of Defense.<sup>104</sup> Agencies involved with science policy, once nearly the sole province of the OSRD, were becoming diffused throughout the Federal government. Because of the ideological and political battles that delayed its enactment, the proposed NSF was to rapidly become only another pillar in a complex edifice of government science rather than the capstone of the entire structure, as Bush and Kilgore originally envisioned it.<sup>105</sup> In the years from 1945 to 1950, Bush's "baby" had become the orphan of national science policy.

The final version of the National Science Foundation Act, S.247, was introduced in the second session of the 81st Congress by Senator Elbert Thomas early in 1950.<sup>106</sup> It combined many of the features of previous compromise bills. Thomas had sponsored, as will be remembered, the Kilgore-Magnuson compromise in 1947. The Foundation was to consist of a board twenty-four members with no ex officio standing appointed by the President. The civilian and non-official composition of the board was a concession to the Bush position, as was S.247's silence on any special provision on patents derived from government sponsored research. The board could recommend a director, but his appointment and removal was to be controlled by the President, a nod to the original Kilgore

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<sup>104</sup> England, A Patron For Pure Science, 90.

<sup>105</sup> Pursell, "Science and Government Agencies," 244.

<sup>106</sup> Lomask, A Minor Miracle, 51.



position. Both director and board were to have an equal voice over the Foundation's formulation of policy.<sup>107</sup> In many ways, Thomas's S.247 reflected the spirit, though not the total substance of S. 1850, the original Kilgore-Magnuson compromise of four years before.

Though the issue of patents had been originally settled in 1946 and the question of political control definitively answered in 1947, the National Science Foundation Act of 1950 still faced more legislative hurdles. An economy-mined House attached a provision that limited the NSF's appropriation to 15 million dollars.<sup>108</sup> With the rising tide of McCathyism, the House also attached another amendment requiring loyalty oaths from scientists receiving scholarships and fellowships from the Foundation.<sup>109</sup> At this point the voice of the scientific community, significantly absent in 1947, became as prominent as it had been in 1946. Dael Wolfle and Edmund Day of the Inter-Society Committee of the AAAS had been quietly working for the passage of a NSF bill, consciously making no attempt to secure an "ideal bill."<sup>110</sup> Then Representative Howard W. Smith, a conservative Virginia Democrat added a further amendment requiring FBI investigation for any scientist receiving

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<sup>107</sup> England, A Patron For Pure Science, 95.

<sup>108</sup> Ibid., 101.

<sup>109</sup> Ibid.

<sup>110</sup> Ibid., 94.



Foundation money.<sup>111</sup> The Smith amendment passed the House and S.247 was returned to the Senate for conference. The leadership of the scientific community, which had been willing to accept any passable compromise and had even submitted to an arbitrary spending limit and loyalty oaths, made its position clearly known. AAAS President Roger Adams fired off a letter to Senator Delbert Thomas, the bill's sponsor, denouncing the Smith amendment as "very unfortunate" and "particularly objectionable."<sup>112</sup> Dael Wolfle, in his role as lobbyist for the scientific community, felt he had a mandate from the Inter-Society Committee to kill the bill rather than accept the Smith amendment.<sup>113</sup> This was precisely the sort of political ammunition that the AAAS had failed to supply in 1947. The scientific community, long divided by ideological and later partisan issues, had finally found its unanimous voice. Faced with such opposition, the conference committee reported the bill back to the House without the Smith amendment, where it was passed on April 27th. The Senate passed S.247 the next day. On May 10th, 1950, President Harry Truman signed the National Science Foundation Act into law, exactly five years to the day from when he first learned of Vannevar Bush's impending Science, the

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<sup>111</sup> Ibid., 102.

<sup>112</sup> Adams to Thomas, (14 March 1950), in "Notes and News," Science 111, n. 2884, (7 April 1950), 371-372.

<sup>113</sup> England, A Patron For Pure Science, 104. (10 May 1950), 553.



Endless Frontier report.<sup>114</sup> The long battle was over but the fruits of victory were not sweet. The AAAS's Science magazine reported the event with the wrong date as the last item of its "Notes and News" section on the last page of its May 19th issue.<sup>115</sup>

The voice of Vannavar Bush, once the most prominent in the debate over the National Science Foundation, becomes conspicuous by its silence on the final compromise that enacted the NSF. He becomes, in the words of one historian, "the man who wasn't there."<sup>116</sup> The reasons for that silence and the political consequences of that absence are critical for any appraisal of the NSF controversy and, perhaps, an understanding of the political debate over national science policy today.

The personal motives for the actions of a historical figure are always difficult to gauge. The motives of Vannavar Bush were indeed critical to the enactment of the NSF. As director of the OWPC and "science czar" of World War II, he gave the proposed National Science Foundation the political prominence to ensure that the close cooperation between the scientific community and the federal government, once unthinkable, would continue after the war. Senator Harley Kilgore, though the original author of the NSF, is generally considered to be less than crucial to that continuation. In this, Kevles is correct in concluding that the

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<sup>114</sup> Ibid., 106.

<sup>115</sup> "Notes and News," Science 111, n.2890, (19 May 1950), 558.



National Science Foundation essentially reflects an elitist victory for the scientific community. Upon his death in 1956, the New York Times noted that Kilgore remained undaunted by the fact that many of his **AFTERMATH AND TODAY** to national problems were ignored by his senatorial colleagues.<sup>117</sup> In the light that the National Science Foundation was truly Bush's "baby," certain

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<sup>116</sup> Lomask, A Minor Miracle, 62. 102. 103.



National Science Foundation essentially reflects an elitist victory for the scientific community. Upon his death in 1956, the New York Times noted that Kilgore remained undaunted by the fact that many of his "special solutions" to national problems were ignored by his senatorial colleagues.<sup>117</sup> In the light that the National Science Foundation was truly Bush's "baby," certain critical questions need to be answered. Why did Bush help scuttle the Kilgore-Magnuson compromise version of 1946? Why did he expend his political energy on the Smith bill of 1947, when it was so clearly headed for veto? How did Bush become the "man who wasn't there" in regard to the final compromise of 1950, when the NSF finally was passed? Why wasn't Bush appointed the National Science Foundation's first director and what might be the political ramifications of his not assuming that office?

These questions can only be partially answered herein -- a critical biography of Vannevar Bush needs to be added to the historiography on American science policy. But Bush cuts such a wide path through the history of post-war American science that some generalizations are possible.

The last question shall be considered first. Shortly before the list of the twenty-four board members for the new NSF was to be released in the late fall of 1950, Bush asked Harry Truman to remove his name from consideration, stating that were he on the board, its members would elect him chairman and that he did not

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<sup>117</sup> Greenberg, The Politics of Pure Science, 102.



think that the scientific community would care to see one man continue in the nation's top science post.<sup>118</sup> In point of fact, Bush's name was not on the list of potential appointments to the Foundation's board, which John Steelman, Truman's science advisor and Bush's old nemesis, had prepared.<sup>119</sup> The omission of a name as prominent as that of Bush was not necessarily due to any rivalry between the two men. The Steelman report, Science and Public Policy, had by 1947 replaced Bush's Science, the Endless Frontier as the authoritative statement on post-war science policy and thus accounts for much of Bush's relative silence during the final events of the political debate over the NSF Act. Steelman later recalled that he had not placed Bush's name on the list for the Foundation's board because "a number" of scientists approached for board membership stated that they would refuse nomination if Vannevar Bush was also named. It must be remembered that Bush lost much of his following in the scientific community over the confrontation with the AAAS in the failure of the 1946 compromise NSF bill. Steelman is quoted as saying that many scientists found Bush "overbearing" and states one in particular described Bush as "one of those fellows who sweeps all before him."<sup>120</sup> It is not known whether Bush's request to be removed from consideration was the act of a man trying to salvage

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<sup>118</sup> Lomask, A Minor Miracle, 62.

<sup>119</sup> Ibid., 64.

<sup>120</sup> Ibid., 82.



some of dignity from a lost political battle, or that of an invulnerably self-confident one.

Bush's self-confidence is well noted in historical studies of the National Science Foundation controversy. His support of the Smith bill of 1947 indicates that despite his loss of standing over science policy in the Truman administration, he still felt he could bring the President around to his way of thinking.<sup>121</sup> Yet Bush also knew full well that his support for a Republican bill while a member of a Democratic administration would infuriate Truman's closest political advisors, who would later influence the President's decision to veto.<sup>122</sup> This proved to be a major miscalculation in light of the administration's stormy relationship with the 80th Congress. The Republican majority refused to compromise over the issue of the political accountability of the Foundation's director, even though Bush personally thought it regretful that Congress did not allow the President the "courteous gesture" of making the appointment.<sup>123</sup> His leadership had been overtaken by events. J. Merton England notes that compromise was possible early on in the legislative history of the National Science Foundation Act, but was difficult as that "changing political circumstances [gave] one group or

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<sup>121</sup> England, A Patron For Pure Science, 67.

<sup>122</sup> Ibid., 66, 80-81.

<sup>123</sup> Ibid., 82.



another the upper hand."<sup>124</sup> Republican Vannevar Bush would have been the logical and most effective voice for arguing the Truman administration's position on the NSF Act before the Republican controlled 80th Congress. The fact that he did not assume that role indicates the supreme confidence he held in his singular vision for national science policy and the faith that he had in his own political party. Bush too looked forward to the 1948 election, like "Mr. Republican" Senate Majority Leader Robert Taft.<sup>125</sup> Both were disappointed.

If compromise was possible, as England points out, why did Bush not support the Kilgore-Magnuson compromise of 1946? It is clear in hindsight that this version of the National Science Foundation offered the Bush position more than the final compromise of 1950. It accepted the Bush proposal on patents, perhaps the most pressing threat of the original Kilgore legislation. It kept Bush's proposed medical and defense research divisions, areas of scientific inquiry later given over to the Office of Naval Research and the National Institute of Health in subsequent versions. The NSF Act of 1950 was but a pale shadow of the vision expressed in Science, the Endless Frontier. Except for the political appointment of its director, the Kilgore-Magnuson bill reflects the Bush position more than any subsequent passable legislation. Yet Bush abandoned it for

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<sup>124</sup> Ibid., 98.

<sup>125</sup> Ibid., 82.



the Mills bill. Why?

England notes that the reasons for the "inordinately long time" it took to achieve a final compromise on the NSF were not so much due to partisan politics but to "differences in personalities and individual rivalries." Compromise was only possible "after some of the most abrasive individuals were on the sidelines."<sup>126</sup> This oblique statement is the most critical comment England makes on the political activities of Vannevar Bush and is unworthy of a history of the National Science Foundation. Bush's refusal to compromise in 1946 had profound implications for the NSF, not merely for the subsequent four year delay before its final enactment, but possibly for the role of the NSF in shaping national science policy in the post-war era. The motives for and the results of the political actions of Vannevar Bush must be more clearly addressed. To paraphrase a truism, all politics are personal. Vannevar Bush was an elite member of the scientific community as well as one of the movers and shakers of war-time Washington. His autocratic and disdainful personality may well have precluded any compromise. The political necessity of cooperating over science policy, his demonstrated area of expertise, with a senator from West Virginia, of all places, must have rankled. Yet there is the earlier indication that Bush, in his role as director of the OSRD, could cooperate with Kilgore in the latter's role in

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<sup>126</sup> Ibid., 98-99.



providing congressional oversight of the nation's war-time science effort. An explanation based on Bush's personality and personal rivalry with Kilgore does not adequately assess the reasons for his bolting to the Mills bill and his abandonment of the 1946 compromise.

As has been shown, Vannevar Bush was a supreme bureaucratic manipulator and a consummate player of power politics. As such, he was far too an experienced politician to assume a political position in which nothing was negotiable. One always asks for twice as much as one wants and settles for half of what one needs. Bush's support for the Kilgore-Magnuson compromise rested on the exclusion of Kilgore's original patent policy, the element of radicalism which prompted Bush to co-opt the Senator's proposal in the first place. Bush had said that if a decent patent policy was obtainable, compromise was possible.<sup>127</sup> The controversy had been settled in Bush's favor. Kilgore's plan for ex officio members of the Foundation's board was similarly excluded in the compromise bill; the board was to be composed of nine members of the scientific community as in Bush's original plan. The only issue that Bush had to compromise on in the Kilgore-Magnuson bill was the presidential appointment of the Foundation's director. Bush did not compromise on this issue because he personally felt he did not have to.

The Mills bill duplicated the original Magnuson proposal,

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<sup>127</sup> Ibid., 42.



which was taken directly out of Science, the Endless Frontier. With the minority repudiation of the Senate's Committee on War Mobilization majority report on the Kilgore-Magnuson compromise in preference for the Mills bill, Bush's plan for the National Science Foundation gained the support of his own Republican party. As early as 1945, rumblings of discontent over the policies of the Truman administration could be heard in the electorate.<sup>128</sup> A minority position in the 79th Congress was sure to become the majority position of the 80th, which it did in the Smith bill. As has been noted before, Bush was confident he could persuade a minority Democratic president to sign a majority Republican bill, especially legislation on a topic that the president had asked to be considered. Even if that failed, Bush, like most Republicans, expected a different president by 1948. Vannevar Bush's refusal to support the Kilgore-Magnuson bill was not due so much to any personal fault, but was a political miscalculation that had profound effects on the direction of post-war science policy.

As early as August of 1947, the time of Truman's veto of the Smith bill, Science magazine pointed out with some dismay that control of government sponsored scientific research was by default resting in the hands of the military.<sup>129</sup> By 1950, on the eve of the National Science Foundation's final passage, the

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<sup>128</sup> Leuchtenburg, A Troubled Feast, 13-14.

<sup>129</sup> "Notes and News," Science 106, n.2746 (15 August 1947), 141.



Office of Naval Research was spending a significant part of the one billion dollars that the federal government had budgeted for scientific research and development -- some three hundred million dollars more than in 1946, the year the Kilgore-Magnuson compromise collapsed. By sponsoring 1200 research contracts with almost 200 universities, the ONR had clearly assumed the role of patron to science originally envisioned for the NSF by Bush and Kilgore. Together with the nominally civilian controlled Atomic Energy Commission, established the same year as the ONR, the Defense Department was spending 96% of all federal dollars allotted for government sponsored scientific research in the nation's universities.<sup>130</sup> These figures do not compare favorably with the 15 million dollar ceiling imposed on the NSF by an economy-minded House in 1950. The original Bush plan in Science, the Endless Frontier had called for a budget of 130 million dollars.<sup>131</sup> The mandate for that figure was lost in the failure of the Kilgore-Magnuson compromise.

Had [the NSF] been set up in 1945 [sic] it would have been of towering importance in the structure of American science. But between 1945 and 1950, the perpetual realities of bureaucratic life and the new element of the East-West cold

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<sup>130</sup> Daniel J. Kevles, "Cold War and Hot Physics: Reflections on Science, Security and the American State," in The Restructuring of Physical Sciences in Europe and the United States 1945-1960: Proceedings of the International Conference on September 19-23, 1988, Universita "La Sapienza", Michelangelo De Maria, et al., eds. (Singapore, New Jersey, London, Hong Kong: World Scientific, 1989), 3-4.

<sup>131</sup> Lomask, A Minor Miracle, 67.



war sapped its incipient primacy.<sup>132</sup>

Worse yet, the House Appropriations Committee in 1950 refused to allow the half-million dollar start-up costs of the National Science Foundation as an economy measure for the Korean War.<sup>133</sup> A more generous Senate gave the NSF only half its legislatively mandated amount for its first fiscal year.<sup>134</sup> By the 1960's, the federal government was spending 8.5 billion dollars on scientific research and development, of which only 200 million was going for basic research in the nation's universities, whose patron was supposed to have been the National Science Foundation.<sup>135</sup> As it stands today, the NSF spends only 4% on the federal government's total outlay of sixty-four billion dollars for scientific research and development.

The "competitiveness" debate of today over science and technology policy that Lewis Branscomb of Harvard discusses centers around the conversion of the country's scientific and technological base from military demands to more commercial applications. The military dominance of post-war American science policy during the Cold War is a well known and historically discussed concern. But what would the effect have

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<sup>132</sup> Pursell, "Science and Government Agencies," 244.

<sup>133</sup> "Notes and News," Science 112, n.2906 (9 September 1950), 288.

<sup>134</sup> Lomask, A Minor Miracle, 67.

<sup>135</sup> Clarence G. Lasby, "Science and the Military," chap. in Science and Society in the United States, eds. David D. Van Tassel and Michael G. Hall, (Homewood, Il: The Dorsey Press, 1966), 290.



been on today's debate if the National Science Foundation had been enacted under the Kilgore-Magnuson compromise in 1946, instead of the later act of 1950, when the bureaucratic leadership over science policy had so clearly passed to other agencies?

Almost certainly, the NSF's first director would have been Vannevar Bush. His political prominence and own considerable ego probably would have made any other choice impossible. As the director of the Office of Scientific Research and Development and chief architect of the NSF, Bush would have been the logical head of the peace-time OSRD. He might not have lost his support in the scientific community and might have retained the confidence of the Truman administration had he accepted the Kilgore-Magnuson compromise and thus not initiated the political brawl that started after its collapse. As the zealous and supremely confident director of a powerful new bureaucracy whose mission had not been dissipated in four years of needless political wrangling, Bush might have been better able to shape the events that placed the military in de facto control of post-war science policy and relegated the National Science Foundation to so marginal a role. It is indeed tragic that Bush never received this opportunity. The first director of the National Science Foundation was Alan Waterman, the former Chief Scientist at the Office of Naval Research.<sup>136</sup>

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<sup>136</sup> Lomask, A Minor Miracle, 68.



The tragedy of Vannevar Bush not being selected as the first director of the NSF was both personal and political. Bush's Modern Arms and Free Men, published in 1949, argued persuasively for the civilian control of the military's scientific research effort.<sup>137</sup> The whole purpose of the OSRD was to establish precisely that control. His original plan for the National Science Foundation included a division of defense research, a proposal frittered away in "Science, the Endless Debate." After the OSRD disbanded the year the Kilgore-Magnuson bill failed, Bush sought to maintain a platform for his views on the civilian control of science policy by assuming the chairmanship of the Joint Research and Development Board in the Department of Defense, a post he held until 1949. But the director's office of a strong and essentially uncompromised NSF established in 1946 would have been a more effective policy vehicle. But Bush instead squandered his political capital in a miscalculation of partisan politics. This does not mean to say that Vannevar Bush could have prevented the military's dominance over national science policy in the Cold War era. But the lost possibility that that dominance might have been mitigated by his views and his skill at bureaucratic maneuvering is the direct consequence of the political actions of Vannevar Bush in 1946.

If the history of the National Science Foundation Act of 1950 reflects the personal and political tragedy of Vannevar

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<sup>137</sup> Greenberg, The Politics of Pure Science, 140.



Bush, then the debate over national science and technology policy today is surely a study in irony. Lewis Branscomb notes that the issue of "competitiveness" today is not whether the United States should have a technology policy but what kind.<sup>138</sup> This comment should recall Representative Cole's question of how the NSF was to be designed. The issues of 1945 and 1992 are eerily similar. Both involve the conversion of the military successes of scientific research to more pacific pursuits in an astoundingly changed world. Branscomb states that the best model for the government's role in today's efforts along these lines is the Defense Advanced Research Projects Agency, or DARPA. DARPA funds emergent technology for military applications. Branscomb advocates a civilian-oriented DARPA to help solve America's "competitiveness" crisis, a proposal reminiscent of Bush's advocacy of a peace-time OSRD, the NSF. The language Branscomb uses to describe DARPA -- a "small staff, highly professional, technically competent, insulate[d] from political pressures" -- echoes the way Bush would have described his OSRD.<sup>139</sup> Such close parallels lead one to ask, is the technology policy of the 90's about to become the divisive issue that science policy became in the 40's?

There is no way to know what the future might bring, especially in this, an election year. If the historical debate

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<sup>138</sup> Lewis M. Branscomb, "Does America Need a Technology Policy?," Harvard Business Review 70, n.2, (March-April 1992), 24.

<sup>139</sup> Ibid., 30.



over the National Science Foundation is any indication, Branscomb's proposal for a civilian "DARPA" is sure to undergo the most intense political and ideological scrutiny, the results of which will fuel a partisan debate. Scientists will once again find themselves in the spotlight of national partisan politics. Don K. Price has pointed out that the federal government appropriates money for science almost on faith.<sup>140</sup> The "American Experiment" of republican democracy has long believed in the efficacy of science policy. The question is, do scientists believe in the efficacy of republican democracy? The political actions of Vannevar Bush show how crucial this question can be. John Steelman's Science and Public Policy was written out of a conviction that Bush's Science, the Endless Frontier represented a profoundly un-democratic sentiment.<sup>141</sup> Meyerhoff's indictment of Bush's political actions accused him of betraying democratic principles.<sup>142</sup> Science and technology policy will not be a scientific question on the part of the federal government, but a political question on the part of the scientists. It remains to be seen if any scientist of today will have the stature or the politics of Vannevar Bush.

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<sup>140</sup> Don K. Price, "The Scientific Establishment," chap. in Scientists and National Policy Making, Robert Gilpin and Christopher Wright, eds., (New York: Columbia University Press, 1964), 20.

<sup>141</sup> Pennick, The Politics of American Science, 67.

<sup>142</sup> Meyerhoff, "Obituary: National Science Foundation, 1946," 98.



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