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SCIENCE ADVICE TO THE PRESIDENT; DURING AND IMMEDIATELY AFTER WORLD WAR II:

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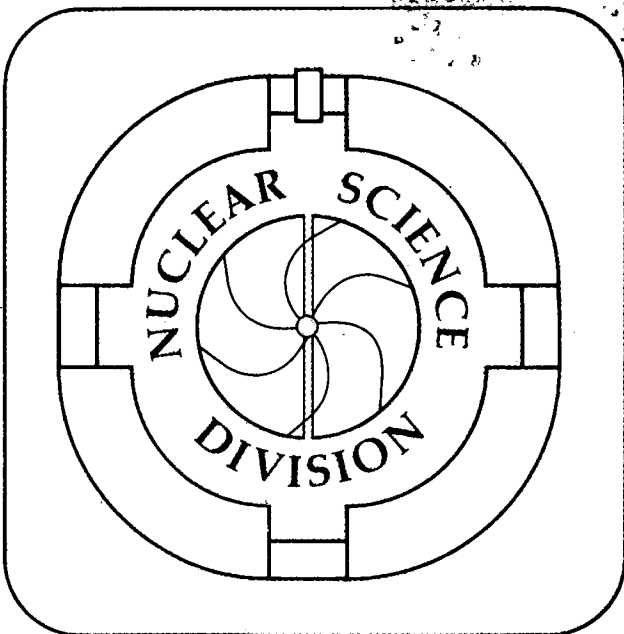
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Presented at the Symposium "Science Advice to the President: The First 200 Years," at the Annual Meeting of the American Association for the Advancement of Science, San Francisco, CA, January 18, 1989

## Science Advice to the President: During and Immediately after World War II

G.T. Seaborg

January 1989



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**SCIENCE ADVICE TO THE PRESIDENT:  
DURING AND IMMEDIATELY AFTER WORLD WAR II**

Presented by

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at  
the Symposium "Science Advice to the President: The First 200 Years"  
at the Annual Meeting of  
the American Association for the Advancement of Science  
San Francisco, CA  
January 18, 1989

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SCIENCE ADVICE TO THE PRESIDENT:  
DURING AND IMMEDIATELY AFTER WORLD WAR II

At the time of the outbreak of World War II the United States had little capacity for science advice to the president or the organization of American science for war. The National Academy of Sciences, created by an Act of Congress in 1863, and the National Research Council, created by an Executive Order in 1918, were in the position to be helpful, but they were not government agencies supported by the Congress and reporting directly to the president and were, therefore, not designed to focus attention on such relatively narrow portions of the field of science as those concerned with the instrumentalities of war.

A more effective organization was the National Advisory Committee for Aeronautics (NACA), established by Congress in 1915 "to supervise and direct the scientific study of the problems of flight." President Roosevelt, in June 1939, directed the NACA to become a consulting and research agency for the Joint Army and Navy Aeronautical Board at the outbreak of a national emergency. For some years prior to the outbreak of the war, the members of the NACA had become acutely conscious that they were living in a pre-war period. Vannevar Bush, a professor of electrical engineering at the Massachusetts Institute of Technology and an inventor with business experience, became chairman of the NACA in 1939 and, not long after that, he resigned the vice presidency of the Massachusetts Institute of Technology to become President of the Carnegie Institution of Washington. After the outbreak of war in Europe, Bush's thoughts turned more and more to the need for an overall organization of science for war. It was at his initiative more than anyone else's that an apparatus for science advice to the president and the gearing of science for aid to the war effort took place.

So far as I can recall, I first met Vannevar Bush during his visit to Berkeley near the end of March 1940. Together with James B. Conant, Karl T. Compton, Arthur H. Compton, and Alfred Loomis, he came to discuss with Ernest O. Lawrence his proposed 184-Inch Cyclotron. My future wife Helen Griggs, who at that time was serving as Ernest's secretary, also met him then and attended a dinner in his honor (Figures 1 and 2).

The discovery of fission by the two German chemists, Otto Hahn and Fritz Strassman, in December 1938, soon led to the recognition that uranium might be developed as the explosive ingredient for a bomb of unprecedented explosive capacity. News of this discovery was brought to the United States in a dramatic fashion by Niels Bohr in January 1939. As one of those familiar with the pre-fission transuranium interpretation, I recall walking the streets of Berkeley for hours, in a combined state of frustration (for having failed to recognize earlier the logic of the nuclear fission interpretation) and exhilaration (in recognition of the beauty of the experiment), when I learned of the Hahn-Strassman result at a Monday evening physics seminar. As is well known, the Americanized Hungarian physicist Leo Szilard (Figure 3) became very concerned about this possibility and believed that he should give some direct advice to President Franklin D. Roosevelt (Figure 4) in order to get the United States started on such a project. Szilard and his Hungarian friend Eugene Wigner went to see the most eminent physicist Albert Einstein (Figure 5) in the summer of 1939, to persuade him, and help him, to write a letter to President Roosevelt, calling attention to the potential of a uranium bomb, the need to ensure the supplies of uranium ore, the German interest in such a project, and the need for action by the appointment of a person to maintain

contact between the Administration and the physicists working on this problem. They enlisted the services of Alexander Sachs, a layman corporation economist who was reputed to have ready access to the White House.

Sachs finally was able to get an appointment with the president on October 11, 1939, at which he presented the letter signed by Einstein with accompanying memoranda. This advice to the president resulted in the immediate appointment of an Advisory Committee on Uranium to investigate the problem. The chairman of the Committee was Lyman J. Briggs, Director of the National Bureau of Standards. The other two members were Navy Commander Gilbert C. Hoover and Army Colonel Keith F. Adamson. Briggs called a meeting of the Committee at the Bureau of Standards for October 21, 1939, which was attended by Szilard and Wigner, and also Edward Teller. As a result of this meeting, the Advisory Committee on Uranium reported to the President on November 1st, that the uranium chain reaction was a possibility, but that it was still unproved and that it might be a possible source of bombs with a destructiveness vastly greater than anything now known. Briggs heard from the President on November 17th that he had noted the report with deep interest and wished to keep it on file for reference. There was little action during the ensuing months. Harold Urey and Vannevar Bush proposed the establishment of an advisory committee of scientific experts to counsel the President's Committee on Uranium. Such a committee was established in June 1940, consisting of Harold Urey, George Pegram, Merle Tuve, Jesse Beams, Ross Gunn, and Gregory Breit.

A new force now appeared on the scene--the National Defense Research Committee (NDRC)--to give science advice to the president and organize American science for war. At the suggestion of Bush, President Roosevelt set up this committee by executive action in June 1940. At the suggestion of Bush it was to be similar in form to NACA, but empowered "to correlate governmental and civil research in fields of military importance outside of aeronautics. It should form a definite link between the military services and the National Academy, it should lean on the latter for broad scientific advice and guidance, it should supplement and not replace activities of the military services themselves, and it should exist primarily to aid these services ..."

Vannevar Bush served as the initial chairman of the NDRC and, during the next year or so, its membership included J. B. Conant (President of Harvard University), who became chairman in 1941; F. B. Jewett, President of the National Academy of Sciences; Rear Admiral J. A. Furer, Coordinator of Research and Development, Navy Department; R. C. Tolman, Dean of Graduate School, California Institute of Technology; K. T. Compton, President, Massachusetts Institute of Technology; Roger Adams, Head of Chemistry Department, University of Illinois; C. P. Coe, U.S. Commissioner of Patents; and Irvin Stewart, who served as Executive Secretary. Carroll L. Wilson also served in a key staff position (Figure 6).

Bush soon moved to strengthen the Committee on Uranium. By the early autumn of 1940, he reorganized the Committee, dropping Commander Hoover and Colonel Adamson and adding Tuve, Pegram, Beams, Gunn, and Urey. However, the ensuing rate of progress was too slow to suit people like Ernest Lawrence and Arthur Compton, who pushed Bush to move things faster.

In order to better coordinate the scientific activities for war, the Office of Scientific Research and Development (OSRD) was established by executive order by President Roosevelt in June 1941 with Bush as director.

The OSRD was located within the Office for Emergency Management of the Executive Office of the President. It oversaw the NDRC, the NACA, the laboratories of the military services, and the newly-created Committee on Medical Research. The Committee on Medical Research consisted of Dr. A. N. Richards, who served as chairman; Dr. Lewis H. Weed, who served as vice chairman; Dr. R. E. Dyer, Public Health Service; Rear Admiral Harold W. Smith; Dr. A. Baird Hastings; Dr. Chester S. Keefer, Medical Administrative Officer; Brigadier General James S. Simmons; Dr. A. R. Dochez; and Dr. Irvin Stewart, who served as Executive Secretary (Figure 7).

Conant replaced Bush as Chairman of the NDRC and the Committee on Uranium became the OSRD's Section on Uranium, soon designated cryptically as the S-1 Section. This then constituted the U.S. administrative body for advice to the president and organization of science for the war that the U.S. was to enter just a few months later. Thus, it oversaw the work on:

radar (carried out under the leadership of Lee A. DuBridge in the Radiation Laboratory at the Massachusetts Institute of Technology),

rockets (carried out by people like Charles C. Lauritsen at the California Institute of Technology at what would become known later as the Jet Propulsion Laboratory),

chemical explosives (carried out under the leadership of such people as George B. Kistiakowsky, Roger Adams, and Warren K. Lewis),

gas warfare (carried out at such places as Edgewood Arsenal in Maryland),

proximity fuses (with leading contributions by Merle A. Tuve at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington),

submarine warfare (two of which laboratories were at New London, Connecticut, operated by Columbia University and at San Diego, run by the University of California, and

military medicine (such as work on antimalarials and blood substitutes, penicilin, and so forth).

A comprehensive account of the role of NDRC and OSRD during the war by James Phinney Baxter, Scientists Against Time, was published in 1946.

Preceded by optimistic reports by Kenneth Bainbridge (in April) and Charles Lauritsen (early in July), based on their visits to England, in July 1941 Bush and Conant received a copy of the draft report prepared by the British MAUD Technical Committee which was very optimistic about the possibilities of producing a nuclear fission bomb (already early in 1940 Otto Frisch and Rudolf Peierls had written a highly secret report that an explosion of great power could be produced with metallic uranium-235; the existence of this report was not known outside of the United Kingdom for over a year). On July 18, 1941 the National Defense Research Committee recommended negotiating contracts to carry into effect the research proposed by the Section on Uranium on the separation of uranium isotopes and the production of the nuclear chain reaction in uranium as a source of Element 94 (later named plutonium). Then the next month Bush and Conant strengthened the Section on Uranium, adding

Samuel Allison, Gregory Breit, Edward U. Condon, Lloyd P. Smith, and Henry D. Smythe; dropping Gunn and Tuve; and retaining Briggs as Chairman and Pegrum as Vice Chairman.

By the end of the summer of 1941, Bush, initially somewhat skeptical, was convinced that the possibility of producing an atomic bomb before the end of the war was so strong that every effort must be made as fast as possible. On October 9, 1941, he met with President Roosevelt and Vice President Henry Wallace to seek authority to proceed at a greatly increased level of intensity with commitments to spend millions of dollars, an increase in orders of magnitude. The president, in an historic decision, agreed both immediately and completely. From this point on, the effort proceeded at an accelerated rate.

In November 1941 Eger V. Murphree, Vice President of the Standard Oil Development Company, was appointed chief of a new Planning Board to advise the S-1 Committee on the engineering aspects. The advent of Pearl Harbor on December 7th resulted in a surge forward. Three program chiefs were appointed--Urey in charge of separation by both the gaseous diffusion and centrifuge method, Lawrence responsible for electromagnetic separation methods and work on Element 94, and Compton responsible for nuclear weapon theory and the chain reaction for producing Element 94. There would correspondingly be main laboratories at Columbia University, the University of California at Berkeley, and the University of Chicago. J. Robert Oppenheimer was brought in by Lawrence to help with the design of the bomb (Figures 8 and 9).

On May 23, 1942 the leaders of the S-1 Section met--Briggs, Murphree, Compton, Lawrence, and Urey--and formulated plans for large-scale uranium-235 enrichment plants, plants for the production of Element 94, and a plant to produce heavy water on a large scale with the aim of producing a few atomic bombs by July 1, 1944. A report of June 13, 1942, incorporating these plans, was approved by President Roosevelt on June 17th. It was now necessary to construct an organization that would make all this possible. In June 1942 Bush authorized the appointment of a new S-1 Executive Committee--Conant as Chairman, with Briggs, Compton, Lawrence, Murphree, and Urey as members.

An important meeting was held at the Bohemian Grove in California on September 13 and 14, 1942, attended by Major Thomas Crenshaw (area engineer at Berkeley), J. R. Oppenheimer, Harold C. Urey, E. O. Lawrence, James B. Conant, Lyman J. Briggs, E. V. Murphree, A. H. Compton, R. L. Thornton, and Col. K. D. Nichols (Figures 10 and 11). A number of important decisions were made--authorization to acquire 1200 tons of high grade Belgian uranium ore stored on Staten Island, a decision to acquire the Tennessee site immediately, a recommendation to secure a chemical company to assist in developing the chemical process for separating plutonium.

It became apparent that more supervisory strength for the atomic bomb project was needed. After some attempts at arrangements that I will not attempt here to describe, the Army was placed in charge. On September 23, 1942, newly-promoted General Leslie R. Groves, chosen by General Brehon B. Somervell and General Wilhelm D. Styer, was given the assignment to run the project as part of the Manhattan Engineer District (established on August 13), which became known as the Manhattan Project. Lieutenant Colonel Kenneth B. Nichols became his chief aide. Bush and Conant and members of the S-1 Executive Committee continued in positions of responsibility. Groves and Nichols have both written interesting accounts of their experiences in

directing the Manhattan Project--Groves' entitled Now It Can Be Told and Nichols' entitled The Road to Trinity--A Personal Account of How America's Nuclear Policies Were Made. I first met Groves during a visit to the Metallurgical Laboratory at the University of Chicago. This was shortly after we had isolated the first weighable samples of plutonium. We showed him a sample of plutonium hydroxide under a microscope. Groves didn't seem very impressed; he disappointed us by saying, "I don't see anything," as he peered into the microscope.

It is beyond the scope of the present account to describe the successful production of uranium-235 and plutonium-239 during the war and their use as the explosive ingredients in bombs for detonation over Hiroshima (uranium-235) and Nagasaki (plutonium-239), which led to the termination of the war following the successful test of a plutonium bomb at Alamogordo, New Mexico, on July 16, 1945 (known as Trinity). Excellent accounts of the work on the atomic bomb have been written by Richard Hewlett and Oscar Anderson (The New World 1939/1946, Volume 1; A History of the United States Atomic Energy Commission) and, more recently, by Richard Rhodes (The Making of the Atomic Bomb). However, I would like to say a few words about attempted advice by scientists to President Harry Truman regarding the use in the war of this weapon of unprecedented power.

At the code-named Metallurgical Laboratory (commonly abbreviated "Met Lab") at the University of Chicago, where I headed a section of the chemistry division, meetings were held and reports circulated in which postwar policy was anxiously discussed. The issues involved were often of a type that most of us, by training, and perhaps also by temperament, were not particularly qualified to consider. Aware though we were of our limitations, there seemed no choice but to address the issues. By an accident of history, we were among a very few who were aware of a new, world-threatening peril, and we felt obligated to express our views to those in authority.

In June 1945 six committees were established at the Met Lab to make recommendations to the government regarding postwar policy. One was a Committee on Social and Political Implications. It was headed by German-born James Franck, a venerated Nobel laureate (1925) in physics. I was a member of this group. Other members all chosen by Franck, were Donald Hughes, James Nickson, Eugene Rabinowitch, Joyce Stearns, and Leo Szilard. The committee's report, shaped mainly by Szilard, with some drafting help from Rabinowitch, was completed on June 11, 1945, and signed by every member of the group. It made, basically, three points. The first was that the United States could not avoid a nuclear arms race through a policy of secrecy. The second was that the best hope for national and world safety from the consequences of the bomb lay in international control of atomic energy. The third was that the military use of the bomb against Japan was "inadvisable" because it would "sacrifice public support throughout the world, precipitate the race for armaments and prejudice the possibility of reaching an international agreement on the future control of weapons." We suggested, instead, that the power of the bomb first be demonstrated in an uninhabited "desert or barren island."

The Franck Report was delivered to Washington on June 12, 1945, by Franck and Compton. Secretary of War Henry Stimson was not available so the Report was left for review by George L. Harrison (former chairman of the New York Federal Reserve Bank and president of the New York Life Insurance Company), who was serving as deputy chairman (Stimson was chairman) of the so-called Interim Committee, a committee charged with the planning that would be

necessary in anticipation of the use of the atomic bomb and the revelation of its existence. Harrison referred the matter to the Interim Committee's Scientific Advisory Panel, consisting of Compton, Fermi, Lawrence, and Oppenheimer, who considered it at a meeting on June 16th at Los Alamos, and decided that the bomb should be used to help save American lives in the Japanese war; the Interim Committee, and finally President Truman, came to the same conclusion. In a poll of 150 Met Lab people in July, 60% favored the military use of the bomb in Japan. A total of about 25% favored giving a demonstration in the United States with Japanese representatives present, followed by an opportunity to surrender before the bomb would be put to military use in Japan. Also in July, a petition prepared by Szilard with 70 signatures at the Met Lab requested that the bomb not be used without warning. This information did not reach Secretary Stimson until August 1st--too late to reach President Truman before his meeting with Winston Churchill and Joseph Stalin at Potsdam.

In a remarkable recent book, Danger and Survival--Choices about the Bomb in the First Fifty Years, McGeorge Bundy makes the suggestion that influential Japanese observers might have been invited to witness the American bomb test at Alamogordo on July 16th. This would have given the Japanese the opportunity to learn of the terrifying impact of the bomb and the option to forestall its use on their cities by agreeing to terms of surrender. This more practical alternative was not suggested by members of the Franck Committee, in part because the requirements of secrecy (compartmentalization) prevented them from having any information about plans for the Alamogordo test. However, in the July 1945, poll at the Met Lab that I mentioned earlier, one of the options was to give an experimental demonstration of the bomb in the United States.

The Atomic Energy Act, creating the Atomic Energy Commission, went into effect on August 1, 1946 (Figure 12). On October 28, 1946, President Harry Truman appointed, and on December 31, 1946 he transferred control to, the five members of the AEC--David E. Lilienthal (Chairman), Lewis L. Strauss, Robert F. Bacher, Sumner T. Pike, and William W. Waymack (Figure 13). Carroll Wilson served as the first General Manager of the AEC, a very important role in its administrative structure.

Near the end of 1946 President Truman appointed me as a member of the nine-person General Advisory Committee (GAC) of the newly established and appointed Atomic Energy Commission. The initial members of the GAC were an awesome group--J. Robert Oppenheimer (who served as Chairman), Enrico Fermi, James B. Conant, Isidor I. Rabi, Lee A. DuBridge, Cyril S. Smith, and industrialists Hood Worthington and Hartley Rowe. With such a membership the GAC exerted a tremendous influence on the initial Commissioners of the AEC. The first meeting of the GAC was held in Washington on January 3, 1947, and I attended meetings on the average of every other month until the end of my term, August 1, 1950. We advised the AEC in a very influential manner on the rehabilitation of the Los Alamos Weapons Laboratory (which had become somewhat disorganized after the end of the war), the operations of the facilities for the production of fissionable material, the diminishing role of secrecy in its operations, the distribution of radioactive isotopes produced in its facilities, the instigation of its marvelous program for the support of basic research in U.S. universities and colleges, the operation of its national laboratories, the direction of its emerging civilian nuclear power program, its organizational structure, and many other areas where we thought our advice, sought or unsought, would be helpful.

An action that gained the most publicity was the GAC's unanimous recommendation, at a meeting near the end of October 1949, which I missed due to a visit to Sweden, that the AEC not proceed with an all-out effort to develop the hydrogen bomb. Two members, Rabi and Fermi, felt that the commitment not to develop the hydrogen bomb should be "conditional on the response of the Soviet government to a proposal to renounce such development." I had sent a letter to Oppenheimer saying that I had reluctantly come to the conclusion that the United States should proceed with a hydrogen bomb program because it was certain that the Soviet Union would do so. The main recommendation of the GAC was endorsed in varying degree by AEC Chairman Lilienthal and Commissioners Pike and Henry Smyth, but rejected by Commissioners Strauss and Gordon Dean (Smyth and Dean had replaced Commissioners Bacher and Waymack). Members of the Joint Committee on Atomic Energy, the President's Cabinet, the military, and many influential scientists also opposed the recommendation of the GAC. We received the word at a meeting of the GAC on January 31, 1950 that President Harry Truman earlier that day, with AEC Chairman Lilienthal, Secretary of State Dean Acheson, and Secretary of Defense Louis Johnson (the special committee of the National Security Council to advise him on this matter), had made his decision that the United States should proceed with the development and production of the hydrogen bomb.

Bundy, in his recent book, speculates about what might have happened if the Rabi-Fermi recommendation had been taken more seriously. They were proposing, in effect, a hydrogen bomb test ban agreement, which would have been readily subject to verification. Unfortunately, nobody pressed for an implementation of this recommendation. I now wonder, had I attended the historic meeting of the GAC in October 1949, and had I joined Rabi and Fermi in their recommendations (I believe I would have done so), would this have made a difference? Probably not. The lack of follow-up is what led to the death of this very practical suggestion.

Bush was concerned with the governmental organization for supporting research after the disbanding of the OSRD at the end of the war. Pending the creation of a national science foundation, which he recommended in his famous report, "Science, The Endless Frontier," he was searching for other coordination mechanisms. In order to coordinate the research and development activities of the military services he created a temporary instrument called the Joint Research and Development Board. Bush served as Chairman, and day-to-day administration was the responsibility of the Executive Secretary, Lloyd V. Berkner, who had worked for Bush at the Carnegie Institution in Washington. Under Berkner's direction the Joint Board in 1946 had organized six committees and each was responsible for one technical area of interest to the Armed Forces. One of these committees was the Atomic Energy Committee, which included three civilian members--Conant (Chairman), Oppenheimer and Crawford H. Greenewalt (a vice president of the duPont Co, who had played such an important role in the company's building of the plutonium production plant at Hanford). The six other members were representatives of the Army and Navy--all members of the Military Liaison Committee that had been created by the Atomic Energy Act to effect liaison between the civilian Atomic Energy Commission and the Armed Services. The Research and Development Board had control over our nation's major science efforts in the early post-war years, and it performed a useful function by providing a forum where the many diverse viewpoints of the three services could be heard and acceptable compromises reached. However, this did not take care of the non-military aspects of the government's interest in science. After five years of persistent lobbying by

scientific interest groups, the Congress finally established the National Science Foundation in 1950. Dr. Alan Waterman was named Director of the NSF. He had served as the Chief Scientist of the Office of Naval Research, which together with the AEC did so much to fill the gap for the support of basic and applied research during the intervening years.

William T. Golden, who had served as the administrative assistant of Lewis Strauss and who later became the longtime Treasurer and member of the Board of Directors of the American Association for the Advancement of Science, served in 1950 as a special consultant to the White House and designed the first science advisory apparatus for President Truman. Oliver E. Buckley, president of the Bell Telephone Laboratory, was appointed by President Truman in April 1951 to be the first Presidential Science Advisor.

This then brings me to the end of my presentation covering science advice during the war and the immediate post-war years.

As a postscript I might add that in 1959 President Eisenhower appointed me to his first Presidential Science Advisory Committee (PSAC), whose membership in 1960 included George W. Beadle, Donald F. Hornig, Jerome B. Wiesner, Walter H. Zinn, Harvey Brooks, Alvin M. Weinberg, David Z. Beckler, Emmanuel R. Piore, John W. Tukey, Wolfgang K. H. Panofsky, John Bardeen, Detlev Bronk, Robert F. Loeb, James B. Fisk, George B. Kistiakowsky, James R. Killian, Jr., Isidor I. Rabi, and I (Figure 14).

Finally, I add that the Atomic Energy Commission persuaded President Richard M. Nixon to present special unique Atomic Pioneer Awards to Bush, Conant, and Groves in a ceremony that took place at the White House on February 27, 1970 (Figure 15).



FIGURE CAPTIONS

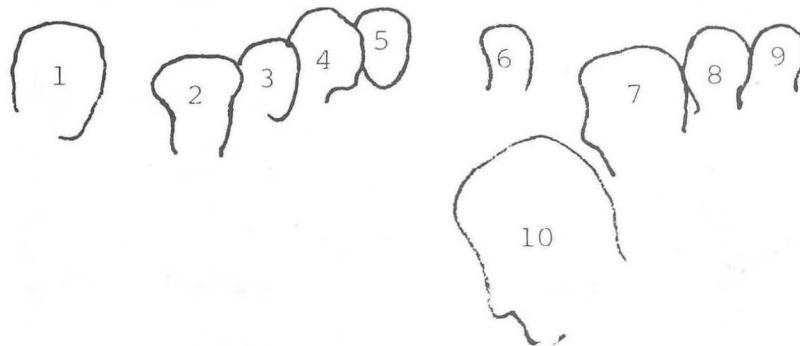
- Figure 1: Meeting in the Radiation Laboratory on the Berkeley campus in March 1940 to discuss the 184-inch cyclotron. (L to R): Ernest O. Lawrence, Arthur H. Compton, Vannevar Bush, James B. Conant, Karl T. Compton, and Alfred Loomis. Morgue 1958-8 (P-40)
- Figure 2: Party at DiBiasi's Restaurant in Albany (near Berkeley) on March 26, 1940. (Clockwise around the table): Ernest Lawrence, Betty (Mrs. Charlton) Cooksey, Vannevar Bush, Molly (Mrs. Ernest) Lawrence, Alfred Loomis, Dorothy Axelrod, David Sloan, Charlton Cooksey, Helen Griggs and S. Mrozowski. Cooksey 187-A
- Figure 3: Leo Szilard in England in 1936. XBB 763-7228.
- Figure 4: Roosevelt, the Earl of Athlone (Governor-General of Canada), and Churchill (with Canadian Prime Minister Mackenzie King in background) meeting in Quebec on August 18, 1943. ZBB 8812-11275
- Figure 5: Portrait of Albert Einstein. ZBB 891-63
- Figure 6: National Defense Research Committee: (front row, L to R): F. B. Jewett (President of the National Academy of Sciences), Rear Admiral J. A. Furer, (USN, Coordinator of Research and Development, Navy Department), J. B. Conant (President of Harvard University), R. C. Tolman (Dean of Graduate School, California Institute of Technology); (rear row, L to R): K. T. Compton (President of Massachusetts Institute of Technology), Roger Adams (Head of the Chemistry Department, University of Illinois), C. P. Coe (U.S. Commissioner of Patents), Irvin Stewart (Executive Secretary of the Office of Scientific Research and Development). ZBB 891-61
- Figure 7: The Committee on Medical Research: (L to R): Dr. R. E. Dyer (Public Health Service), Rear Admiral Harold W. Smith; Dr. A. Baird Hastings; Dr. Chester S. Keefer (Medical Administrative Officer), Dr. A. N. Richards (Chairman), Dr. Lewis H. Weed (Vice-Chairman), Brigadier General James S. Simmons, Dr. A. R. Dochez, and Dr. Irvin Stewart (Executive Secretary).
- Figure 8: Vannevar Bush and Arthur Compton in 1940. XBB 793-3586.
- Figure 9: Lawrence, Seaborg and Oppenheimer in early 1946 at the controls of the magnet of the 184-inch cyclotron, which was being converted from its wartime use to its original purpose as a cyclotron. Morgue 1946-12 (P-1)
- Figure 10: Meeting at the Bohemian Grove on September 13, 1942: (L to R): Major Thomas Crenshaw (area engineer at Berkeley), J. R. Oppenheimer, Harold C. Urey, E. O. Lawrence, James B. Conant, Lyman J. Briggs, E. V. Murphree, A. H. Compton, R. L. Thornton, and Colonel K. D. Nichols. Morgue 1958-8 (P-71).

- Figure 11: Meeting of the S-1 Executive Committee at the Bohemian Grove on September 13, 1942: (L to R): Harold C. Urey, Ernest O. Lawrence, James B. Conant, Lyman J. Briggs, Eger V. Murphree, and Arthur H. Compton. Morgue 1958-8 (P-70).
- Figure 12: Members of the Special Senate Committee on August 1, 1946 gathered around President Truman as he signed the Atomic Energy Act of 1946.: (L to R): Senators Thomas Connally, Eugene D. Millikin, Edwin C. Johnson, Thomas C. Hart, Brien McMahon, Warren R. Austin, and Richard B. Russell. XBB 8812-11336.
- Figure 13: President Truman transferring control to the Atomic Energy Commission on December 31, 1946. (L to R, seated): Carroll Wilson, Truman, and David Lilienthal; (L to R, standing): Commissioner Sumner T. Pike, Colonel Kenneth D. Nichols, Secretary of War Robert P. Patterson, General Leslie R. Groves, Commissioner Lewis L. Strauss, Commissioner William W. Waymack. (The fifth commissioner, Robert F. Bacher, was at Los Alamos.) ZBB 8812-11276.
- Figure 14: Members of the President's Science Advisory Committee with President Dwight David Eisenhower at the White House on December 16, 1960. (L to R standing): George W. Beadle, Donald F. Hornig, Jerome B. Wiesner, Walter H. Zinn, Harvey Brooks, Seaborg, Alvin M. Weinberg, David Z. Beckler, Emmanuel R. Piore, John W. Tukey, Wolfgang K. H. Panofsky, John Bardeen, Detlev Bronk, Robert F. Loeb; (L to R seated): James B. Fisk, George B. Kistiakowsky, President Eisenhower, James R. Killian, Jr., Isidor I. Rabi. XBB 888-8758
- Figure 15: Atomic Pioneer Award ceremony at the White House on February 27, 1970: (L to R): Seaborg, President Richard M. Nixon, General Leslie Groves, Vannevar Bush, and James B. Conant. XBB 884-3249



Fig. 1

Morgue 1958-8 (P-40)



1. Ernest Lawrence, 2. Betty (Mrs. Charlton) Cooksey, 3. Vannevar Bush, 4. Molly Lawrence, 5. Alfred Loomis, 6. Dorothy Axelrod, 7. David Sloan, 8. Charlton Cooksey, 9. Helen Griggs, 10. S. Mrozowski

Cooksey 187A

Fig. 2



XBB 763-7228

Fig. 3

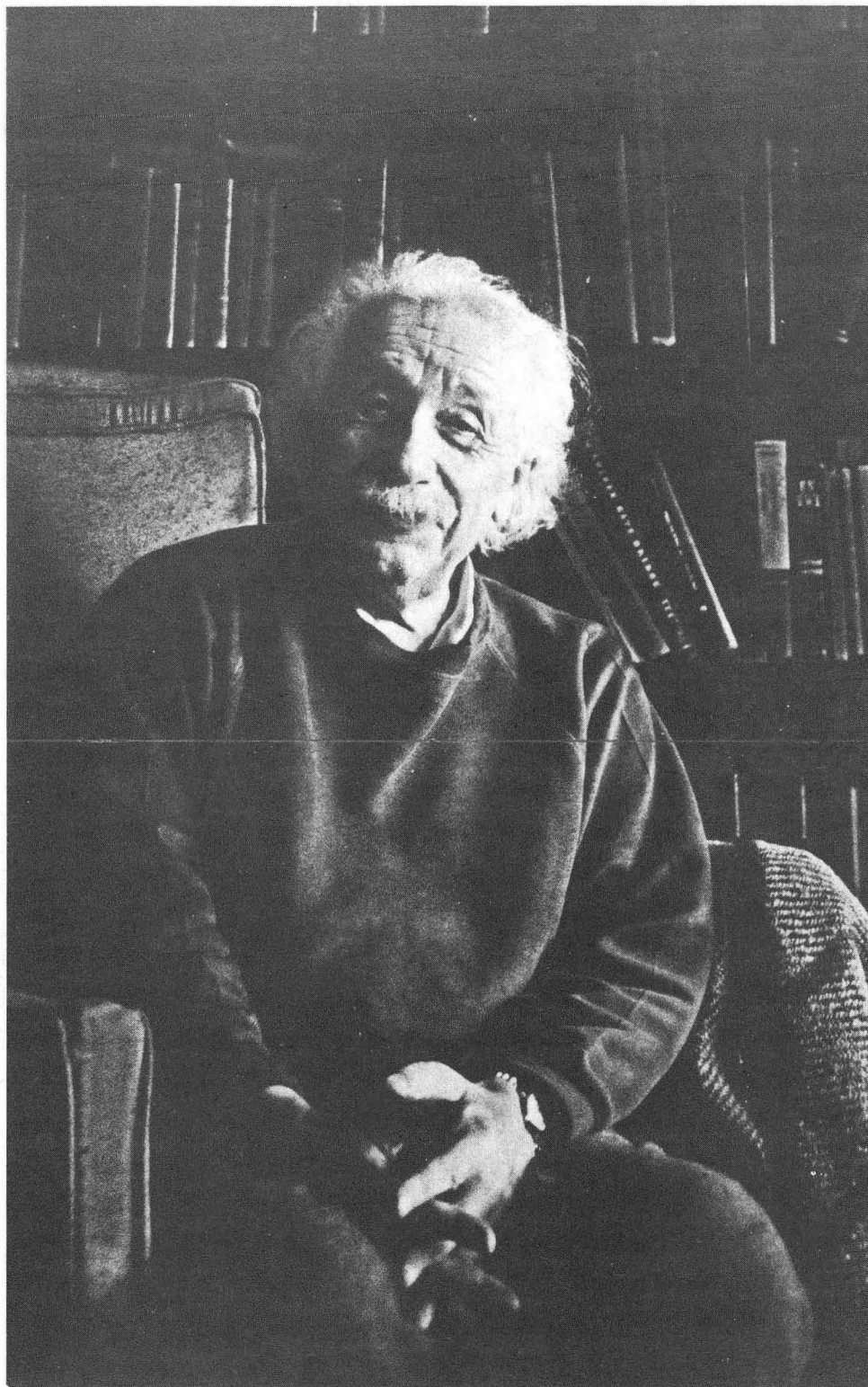




ROOSEVELT AND CHURCHILL AT QUEBEC. 1943 / Photograph taken August 18, the day before the President and the Prime Minister signed the Quebec Agreement. Canadian Prime Minister Mackenzie King is in the background, while in the foreground is the Earl of Athlone, Governor-General of Canada.

ZBB 8812-11275

Fig. 4



*Albert Einstein · 1879-1955*

ZBB 891-63

Fig. 5



### National Defense Research Committee

FRONT ROW (left to right): F. B. Jewett, President of the National Academy of Sciences; Rear Admiral J. A. Furer, USN, Co-ordinator of Research and Development, Navy Department; J. B. Conant, President of Harvard University; R. C. Tolman, Dean of Graduate School, California Institute of Technology  
REAR ROW: K. T. Compton, President of Massachusetts Institute of Technology; Roger Adams, Head of Chemistry Department, University of Illinois; C. P. Coe, U. S. Commissioner of Patents; Irvin Stewart, Executive Secretary of the Office of Scientific Research and Development





### The Committee on Medical Research

*Left to right: Dr. R. E. Dyer, Public Health Service; Rear Admiral Harold W. Smith, Navy; Dr. A. Baird Hastings; Dr. Chester S. Keefer, Medical Administrative Officer; Dr. A. N. Richards, Chairman; Dr. Lewis H. Weed, Vice-Chairman; Brigadier General James S. Simmons, Army; Dr. A. R. Dochez; Dr. Irvin Stewart, Executive Secretary*

Fig. 7

ZBB 891-62



XBB 793-3586

Fig. 8



Morgue 1946-12 (P-1)

Fig. 9





Morgue 1958-8 (P-71)

Fig. 10



Morgue 1958-8 (P-70)

Fig. 11



*Members of the Special Senate Committee: (left to right) Senators Tom Connally, Eugene D. Millikin, Edwin C. Johnson, Thomas C. Hart, Brien McMahon, Warren R. Austin, and Richard B. Russell, on Aug. 1, 1946, gathered around President Truman as he signed the bill which thereby became the Atomic Energy Act of 1946 and, as part of it, established the AEC.*

XBB 880-11336

Fig. 12





HARRIS AND EWING

PRESIDENT TRUMAN TRANSFERS CONTROL TO THE ATOMIC ENERGY COMMISSION, DECEMBER 31, 1946 / The President is signing the executive order formally transferring control from the Army, effective 12:01, January 1, 1947. General Manager Carroll L. Wilson is on the President's right; Chairman David E. Lilienthal on his left. Standing, left to right: Commissioner Sumner T. Pike, Colonel Kenneth D. Nichols, Secretary of War Robert P. Patterson, General Leslie R. Groves, Commissioner Lewis L. Strauss, Commissioner William W. Waymack. The fifth Commissioner, Robert F. Bacher, was at Los Alamos.

ZBB 8812-11276

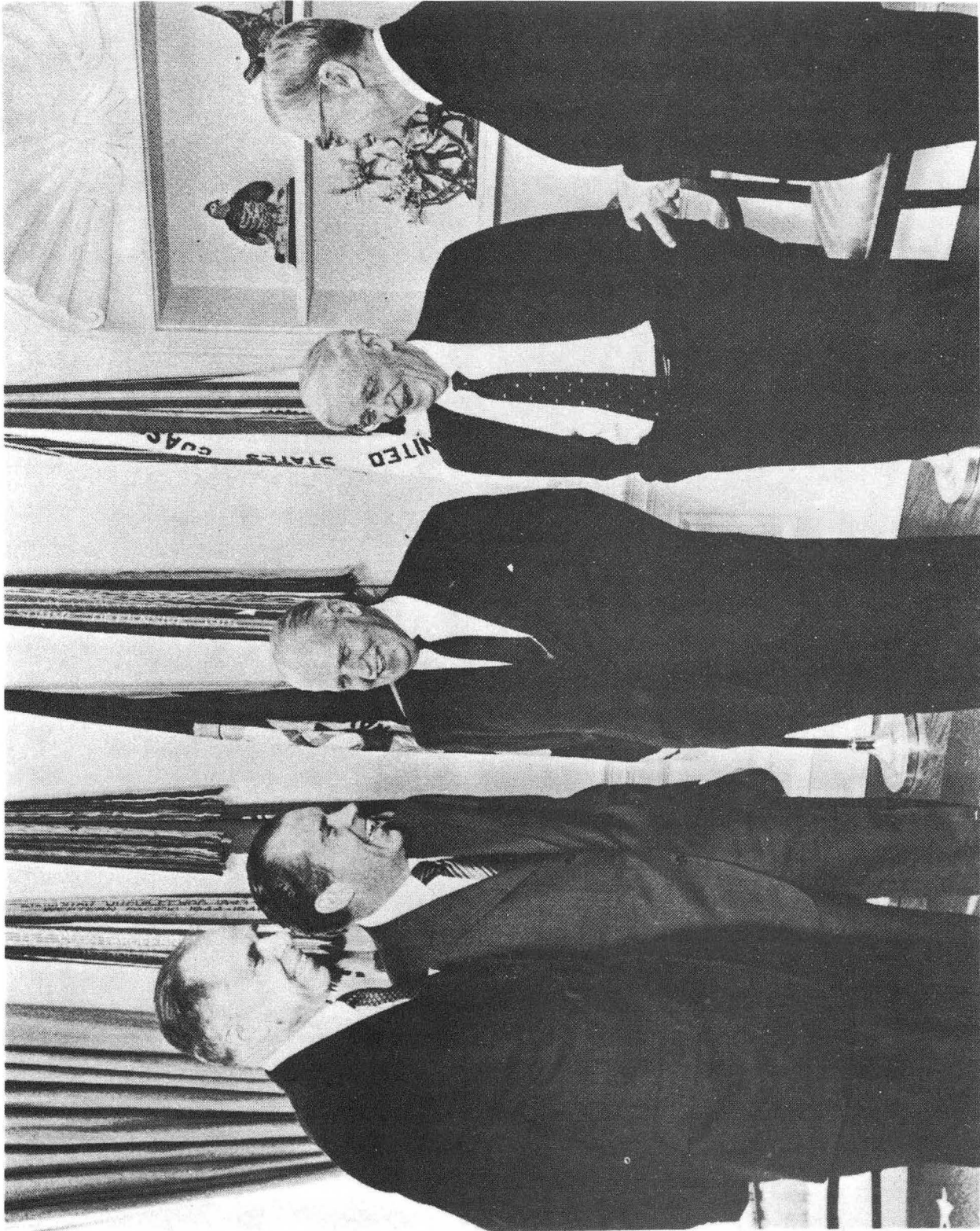
Fig. 13



XBB 888-8758

Fig. 14





XBB 8844-3249

Fig. 15

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