Endless Frontier: Vannevar Bush, Engineer of the American Century

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sionate defender of "big business." Neuse disagrees with those of Lilienthal's contemporaries, including many friends and colleagues, who saw this alignment as a betrayal of his earlier principles. Lilienthal worked closely with André Meyer of Lazard Frères, and later with Rodman Rockefeller, to push TVA-style development projects globally. During these years his new financial interests and his belief that capitalist development would solve all problems clouded his judgment, as he aggressively defended the Shah of Iran and provided cover for Lyndon Johnson's escalation in Vietnam by acceding to Johnson's request that he assist the South Vietnamese government in postwar economic planning, thereby giving the regime and the war a legitimacy they would otherwise have lacked.

Neuse's balanced and informative account of Lilienthal's life is clearly the work of a political scientist, not a historian, and his analysis is not always informed by the latest historical research. Neuse demonstrates excellent insight into Lilienthal's shifting political views but often fails to make full sense of them in their broader social, cultural, and political context. By focusing narrowly on Lilienthal, he often overlooks developments that shed light on events crucial to Lilienthal's life. When discussing the shortcomings of the Acheson-Lilienthal plan, for example, he ignores the devastating critique made by Secretary of Commerce Henry Wallace and the enormous controversy Wallace's bold statements provoked. His assessment of Lilienthal's post-1945 political transformations only minimally probes Cold War pressures: Neuse even goes so far as to characterize the 1950s as an "exhilarating time" of peace, prosperity, and reduced international tension. Nor should one look to this work for profound insight into the character and motivations of Lilienthal and the other historical figures whose paths he crossed. What Neuse has produced, however, is a richly detailed and often insightful biography of a man who contributed enormously to American public life in the 1930s and 1940s, a volume that helps fill a serious gap in our knowledge of those crucial decades.

PETER J. KUZNICK

G. Pascal Zachary. *Endless Frontier: Vannevar Bush, Engineer of the American Century.* viii + 520 pp., illus., app., bibl., index. New York: Free Press, 1997. $32.50.

His friends called him "Van," Vannevar Bush liked to say, because they could not correctly pronounce his full first name (it rhymed with "beaver"). A pioneer of modern computing and supreme organizer of military research during World War II, Bush was "Dr. Win-the-War" to millions of Americans by the end of the conflict. His achievements prompted G. Pascal Zachary to call the enigmatic New Englander the "engineer of the American century" and the most influential scientific statesman since Benjamin Franklin. In this lively and richly detailed first full-length biography of Bush, Zachary, a senior writer at the *Wall Street Journal,* has made a good case for his claim.

Born on 11 March 1890, Bush, the son of a Universalist pastor, was a sickly child but combative and self-reliant. His talented sister Edith helped inspire Bush's interest in mathematics, and the natural tinkerer thrived in a romantic age of invention. Brilliant, fiercely independent, politically conservative, and full of entrepreneurial spirit, Bush studied at Tufts and received his Ph.D. in electrical engineering at MIT. He returned to Tufts as a teacher before joining the MIT faculty in 1919; at MIT he became vice president and dean of engineering in 1932. All the while, Bush was engaged in stimulating and profitable contract work with industrial firms and government agencies as a consulting engineer. His failure to convince the navy to adopt one of his inventions during World War I, however, taught him lessons that he applied well in the next war.

In 1940, along with several other leaders of American science and engineering, Bush, then president of the Carnegie Institution of Washington, successfully lobbied President Franklin Roosevelt for the establishment of a civilian-run National Defense Research Committee (NDRC) that, although coordinated with the military, would remain an independent entity. Bush headed the NDRC and, later, the more powerful Office of Scientific Research and Development (OSRD), of which the NDRC became a part. Instead of establishing its own laboratories and bringing thousands of scientists and engineers onto the government's payroll, Bush's NDRC/OSRD system broke new ground by contracting with industrial labs and universities to work on defense-related projects on an unprecedented scale. To make this system effective, Bush had to overcome traditional military resistance to civilian involvement in weapons design and deployment. The program paid off handsomely, producing radar, the proximity fuse, and the atomic bombs, among other things, all of which played a critical role in the Allied victory (curiously, Zachary mentions another by-product, penicillin, only in passing). But, as Zachary

points out, the practice also led to the rise of unaccountable technocracy, divisive politicization of science, and troubling conflict of interest.

The sensational wartime successes of the OSRD gave Bush a powerful voice in postwar planning in science and government. In 1945, crafting his famous report, *Science, the Endless Frontier,* Bush proposed the establishment of what eventually became the National Science Foundation (NSF) to help cement the science-state partnership. But the five-year delay in the passage of the NSF bill, which Zachary blames largely on Bush's ideological intransigence in his fight with the populist senator Harley Kilgore, allowed the military to seize the lion's share in the patronage of American science and technology. In many ways, Zachary argues, Bush's insistence on an independent civilian role in military technology and policy gave way to a rival vision of his critics, such as Edward Bowles and Theodor von Kármán, who helped the military establish its own system of technical expertise, partly by attracting civilians with patronage. One might argue, however, that the rise of the President's Science Advisory Committee in military technology policy during the Eisenhower years represented a partial revival of Bush's dream.

Bush emerges from this book as inventive, crafty, and contradictory in many respects. He held strong ideological positions but could be pragmatic. He harbored a technocrat's distrust of participatory democracy and yet did his best to defend it against the fascist threat during the war. Mining a vast array of archival materials, including oral histories, and building on the research of scholars such as Larry Owens, Daniel Kevles, Stanley Goldberg, and Martin Collins, Zachary has given us a sympathetic but at the same time critical portrait of the man who, perhaps more than anyone else, shaped the rise of the military-industrial-academic complex. Zachary advances no grand theses, but snappy analyses throughout the book offer provocative observations on the role of experts in a democratic society.

ZUOYUE WANG

Glenys Gill; Dagmar Klenke. *Institute im Bild.* Part 1: *Bauten der Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften.* (Veröffentlichungen aus dem Archiv zur Geschichte der Max-Planck-Gesellschaft, 5.) 144 pp., frontis., illus., fig. Berlin: Selbstverlag des Archivs, 1993.

Petra Hauke. *Bibliographie zur Geschichte der Kaiser-Wilhelm-/Max-Planck-Gesellschaft zur Förderung der Wissenschaften (1911–1994).* (Veröffentlichungen aus dem Archiv zur Geschichte der Max-Planck-Gesellschaft, 6.). 3 volumes. xiv + xii + xii + 508 pp., frontis., indexes. Berlin: Selbstverlag des Archivs, 1994.

Heinrich Parthey. *Bibliometrische Profile von Instituten der Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften (1923–1943): Institute der Chemisch-Physikalisch-Technischen und der Biologisch-Medizinischen Sektion.* (Veröffentlichungen aus dem Archiv zur Geschichte der Max-Planck-Gesellschaft, 7.) 220 pp., frontis., figs., tables, bibl., index. Berlin: Selbstverlag des Archivs, 1995.

Dirk Ullmann. *Quelleninventar Max Planck.* (Veröffentlichungen aus dem Archiv zur Geschichte der Max-Planck-Gesellschaft, 8.) 176 pp., frontis., illus., bibl., index. Berlin: Selbstverlag des Archivs, 1996.

These four thoroughly researched, carefully compiled, and well-produced volumes by the Archive for the History of the Max-Planck-Gesellschaft in Berlin-Dahlem are the latest publications (Volumes 5–8) reporting holdings at the archive or elsewhere of materials related to the history of the Kaiser-Wilhelm Gesellschaft zur Förderung der Wissenschaften (KWG, from 1911 to 1946), its successor organization, the Max-Planck-Gesellschaft zur Förderung der Wissenschaften (MPG, from 1946 on), and the German physicist Max Planck, who was twice president of the KWG (1930–1937 and 1945–1946) and honorary president of both the KWG and the MPG (1946).

Volume 5, by Glenys Gill and Dagmar Klenke, is a picture book of the KWG's more than fifty institutes and research locales. It presents 204 photographs of KWG buildings, ground plans, floor plans, lecture halls, laboratories, libraries, offices, directors' villas, experimental field stations and sites, and so on. The volume is a little treasure.

Volume 6, by Petra Hauke, is a five-part bibliography devoted to the history of the KWG and the MPG. All told, it lists 4,724 items of both primary and secondary literature published between 1911 and 1994. This volume actually consists of three volumes, themselves divided into five parts. The first two parts list 775 items pertaining to the KWG's and MPG's organizational history and administration, reporting items ranging from regulations, membership lists, handbooks, annual reports, periodicals, and the like,