

The History of Science in the United States *An Encyclopedia*

Edited by
Marc Rothenberg
Smithsonian Institution

GARLAND PUBLISHING, INC.
NEW YORK & LONDON
2001

Powell added to his responsibilities in 1881, becoming director of the Geological Survey. He expanded the survey's early focus on mining and minerals geology in the West to a national survey emphasizing topographic mapping and general geology. In 1888, Powell responded to congressional interests with the organization of an Irrigation Survey. Intended to identify irrigable lands and reservoir sites in the West, the work became controversial and was terminated in 1890. Controversy continued to surround Powell's policies, however, forcing his resignation as director in 1894. He continued as director of the Bureau of American Ethnology, but was less active through the remainder of the decade. Powell spent most of his energies in the later years of his life writing educational expositions on geology and geography, and elaborating his views on human evolution.

Each of the major aspects of Powell's scientific life—his geological and anthropological ideas and his direction of two scientific bureaus—has received coverage by historians. However, it is only in his career as an architect of geological surveys that the literature is rich enough to display some diversity of interpretation. This aspect of his career began to draw attention in the 1940s, first from writers interested in federal policies toward the public lands. Powell's preeminent image as a courageous explorer and land law reformer originated in this period, as his canyon adventure and his advocacy of enlightened land policies often were center stage. Excellent biographies of Powell date from this period and include discussions of historical resources.

Historians of science have added attention to Powell's administrative career, primarily in works that focus on the Geological Survey or its antecedents. Powell has received generally favorable treatment in these works, which is consonant with the demonstrable growth of the Geological Survey under Powell and with Powell's image as a trailblazer for Progressive Era conservation. The Geological Survey's centennial history departs from this norm, criticizing Powell's choice of general geology rather than economic geology for the survey's program.

Works displaying the intellectual context of Powell's ideas are rare. This is regrettable, as Powell, through his direction of the Geological Survey and the Bureau of American Ethnology, was among the most prominent figures in nineteenth-century American science. His ideas were influential among his associates in geology and in anthropology. Moreover, Powell lived and

worked in a period of great change in science. Studies of his ideas can help to illuminate the disintegration of natural history, the impact of evolution theory, and the paths of development taken by geology, geography, and anthropology in their American settings.

BIBLIOGRAPHY

- Chorley, Richard J., Antony J. Dunn, and Robert P. Beckinsale. *History of the Study of Landforms, or the Development of Geomorphology*. London: Methuen, 1964.
- Darrah, William Culp. *Powell of the Colorado*. Princeton: Princeton University Press, 1951.
- Hinsley, Curtis M., Jr. *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology, 1846–1910*. Washington, DC: Smithsonian Institution Press, 1981.
- Lacey, Michael James. "The Mysteries of Earth-Making Dissolve: A Study of Washington's Intellectual Community and the Origins of American Environmentalism in the Late Nineteenth Century," Ph.D. diss., George Washington University, 1979.
- Manning, Thomas G. *Government in Science. The U. S. Geological Survey 1867–1894*. Lexington: University of Kentucky Press, 1967.
- Powell, John Wesley. *Exploration of the Colorado River of the West and Its Tributaries. . . .* Washington, DC: Government Printing Office, 1875.
- . *Report on the Lands of the Arid Region of the United States, with a More Detailed Account of the Lands of Utah*. 2d ed. Washington, DC: Government Printing Office, 1878.
- . "Human Evolution." *Transactions of the Anthropological Society of Washington* 2 (1883): 176–208.
- . *Indian Linguistic Families of America North of Mexico*. Washington, DC: Government Printing Office, 1891.
- Rabbitt, Mary C. *Minerals, Lands, and Geology for the Common Defence and General Welfare*. Vol. 2: 1879–1904. Washington, DC: Government Printing Office, 1980.
- Warman, P.C. "Catalogue of the Published Writings of John Wesley Powell." *Proceedings of the Washington Academy of Sciences* 5 (1903): 131–187.
- Zernel, John Joseph. "John Wesley Powell: Science and Reform in a Positive Context." Ph.D. diss., Oregon State University, 1983.

John J. Zernel

President, Scientific Advice to

Recommendations to the president on issues involving science and technology, especially their use and support by the federal government. Presidential science advising initially concentrated on military applications

P

of science and technology, but it has gradually expanded into other areas, such as the support of science, the space program, international relations, and the environment.

As a relatively new part of the system of providing scientific advice to the government, presidential science advising took its shape during World War II, in the form of the Office of Scientific Research and Development (OSRD) under the direction of Vannevar Bush. Earlier attempts at channeling science advice to the government, such as the National Academy of Sciences (founded 1863), the National Research Council (founded 1916), and the Science Advisory Board (1933–1935), were all directed at government agencies, not the presidency. As semiofficial groups, they often acted only in response to requests from the government. Bush and the OSRD broke this tradition by acquiring the authority to take initiatives and to contract with university laboratories and industrial firms. Bush became the de facto science advisor to President Franklin D. Roosevelt during World War II. He provided advice of his own and of other scientists to Roosevelt, especially on the making and using of the first nuclear weapons.

The end of the war brought the dissolution of the OSRD, and Bush left the Executive Office of the President shortly after Harry Truman became president. The Korean conflict led to the formation in 1951 of a Science Advisory Committee in the Office of Defense Mobilization (ODM-SAC), with the chairman reporting to both the ODM director and the president. The group, first chaired by Oliver Buckley, then Lee DuBridge, and finally I.I. Rabi, included many veteran scientists from the wartime Manhattan Project and the Radiation (Radar) Laboratory of the Massachusetts Institute of Technology. It fought for increased federal, and especially military, support of basic research. It also sponsored studies of American defense policy by scientists and engineers. One such project, the Technological Capabilities Panel under James Killian of MIT, resulted in a great acceleration of American missile programs and intelligence capabilities in the mid-1950s. Despite these successes, the ODM-SAC largely languished in the shadow of the H-bomb debate and McCarthyism of this period.

The launching of the Soviet satellite, *Sputnik*, in 1957 marked a turning point in the history of scientific advice to the president. President Dwight D. Eisenhower appointed Killian as his special assistant for

science and technology (commonly known as science advisor) and moved the ODM-SAC into the White House as the President's Science Advisory Committee (PSAC). Killian (succeeded in 1959 by George Kistiakowsky) and PSAC advised Eisenhower on missile and space programs, advocated a nuclear test ban, and fought for increased federal funding of science as a way to enhance American national security and international prestige. They also helped establish the subcabinet Federal Council for Science and Technology in 1959. In 1961, when John F. Kennedy moved into the White House, Jerome Wiesner became the new science advisor. A year later, a new statutory Office of Science and Technology (OST), with the science advisor as director, was established in the Executive Office of the President to strengthen science advising. During this period, presidential science advising expanded into health and environmental issues. PSAC's report *The Use of Pesticides* in 1963, for example, was influential in the acceptance of Rachel Carson's warning of the harms of excessive use of pesticides in her book *Silent Spring*. But the effectiveness of the PSAC system of science advising decreased in the Lyndon Johnson and Richard Nixon presidencies, as scientists both in and out of PSAC opposed the administrations' antiballistic missile and supersonic transport programs and the Vietnam War. Nixon abolished PSAC and the OST in 1973.

The National Science Foundation director served as presidential science advisor until 1976, when a congressional act led to the resurrection of the position of science advisor and the creation of the White House Office of Science and Technology Policy. Although a White House Science Council reporting to the science advisor operated in the Ronald Reagan administration, a PSAC-like committee reporting to the president was not reestablished until 1989, in the form of the President's Council of Advisers on Science and Technology (PCAST) reporting to President George Bush and his science advisor, D. Allan Bromley. The major change under President William Clinton was the creation of the National Science and Technology Council, comprised of major cabinet officers and chaired by the president, to coordinate national science policy in the post-Cold War era.

Presidential science advising attracted little attention until after World War II, when the work of Bush and the OSRD became widely known. Interest in the subject rose in the 1950s and 1960s as historians, political

scientists, and journalists began to study science in the federal government. These studies tended to focus on the role of presidential science advisors in nuclear weapons policy and arms control negotiations. Supporters and critics of the PSAC-system of science advising debated over whether it was proper for scientists to venture into national policymaking and whether elitism dominated science advising and science policy. The demise of PSAC in the early 1970s brought forth writings, mainly by former science advisors but by others, too, calling for its restoration.

With the recent opening of previously closed government archives and with the rising interest in American science during the Cold War, presidential science advising has become a significant subject of investigation by historians of science. The focus of these works has broadened beyond nuclear policy to explore the science advisors' roles in national and international science policy during the Cold War and in other fields, such as health and environment. Presidential science advising emerges from these studies as a key part of the national security state and of the contract between American science and the government during the Cold War.

Although the presidential libraries and the National Archives have opened a large amount of materials by or on presidential science advisors, a complete picture of presidential science advising will still have to await the declassification of the remaining closed records. Another important aspect that is largely missing in the current literature is an assessment of the significance of informal presidential science advising such as was rendered to the several Republican administrations by the politically conservative physicist Edward Teller. Useful insights to science advising could also come from comparisons with presidential advising in other fields, such as the economy, and with science advising in other countries.

BIBLIOGRAPHY

- Bromley, D. Allan. *The President's Scientists: Reminiscences of a White House Science Advisor*. New Haven: Yale University Press, 1994.
- Dupree, A. Hunter. *Science in the Federal Government: A History of Policies and Activities to 1940*. Cambridge, MA: Harvard University Press, 1957.
- Golden, William T., ed. *Science Advice to the President*. New York: Pergamon Press, 1980.
- Herken, Gregg. *Cardinal Choices: Presidential Science Advising from the Bomb to SDI*. New York: Oxford University Press, 1992.
- Hewlett, Richard G., and Oscar E. Anderson Jr. *The New World: A History of the United States Atomic Energy Commission*. Vol. 1: 1939–1946. University Park: Pennsylvania State University Press, 1962.
- Kevles, Daniel. "Cold War and Hot Physics: Science, Security, and the American State, 1945–56." *Historical Studies in the Physical and Biological Sciences* 20:2 (1990): 239–264.
- Killian, James R., Jr. *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology*. Cambridge, MA: MIT Press, 1977.
- Kistiakowsky, George B. *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology*. Cambridge, MA: Harvard University Press, 1976.
- Lambright, W. Henry. *Presidential Management of Science and Technology: The Johnson Presidency*. Austin: University of Texas Press, 1985.
- Smith, Bruce L.R. *The Advisors: Scientists in the Policy Process*. Washington, DC: The Brookings Institution, 1992.
- Thompson, Kenneth W., ed. *The Presidency and Science Advising*. Vols. 1–7. Lanham: University Press of America, 1986–1990.
- Wells, William G. "Science Advice and the Presidency, 1939–1976." Ph.D. diss., George Washington University, 1976.

Zuoyue Wang

Priestley, Joseph (1733–1804)

English natural philosopher and theologian who emigrated to the United States in 1794. By then Priestley had essentially completed his scientific career. From the publication of his *History of Electricity* in 1767 to that of his last volume of *Experiments and Observations on Air* (1777), he had been a major figure in eighteenth-century science. Then the introduction of Lavoisier's oxidation chemistry made Priestley's phlogistic-mechanical chemistry obsolete. Also his increasing devotion to theological polemics and political agitation would lead to the "Church-and-King Riot" of 1791 in Birmingham and eventually to his seeking asylum for himself and his family.

In spite of the decline of his scientific reputation, Priestley was probably the most prestigious refugee the United States would see in decades. He was not entirely unknown there. He had been a friend of Benjamin Franklin and a vigorous supporter of the colonists' cause before and during the American Revolution. His books, on theology, politics, and education had been read in the United States, where he was perhaps better known for nonscientific work than for science. Twelve