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managers who were applying the methods of science to the old problems of government." He quickly turned the FBI into one of the most respected agencies of government: effective, independent, and free of corruption.

Yet Powers judges Hoover's historical legacy as "profoundly ambiguous." His successes were impressive. He achieved his life's goal of destroying American communism (although, it could be argued, it was doomed to failure anyway). He pioneered new techniques of criminal investigation, and in cooperation with state and local authorities, brought into being the modern American system of law enforcement. He devoted enormous energy to upholding traditional values as he understood them. Unfortunately, his attachment to these values sometimes led him to support racial and other injustices. The qualities of leadership that had stood him in good stead for most of his life were strangely at odds with the cultural changes of the post-World War II era. In the end, says Powers, J. Edgar Hoover "endured too long."

—Michael J. Lacey  
*Secretary, American Society and Politics Program*

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**THE LAUNCHING OF  
MODERN AMERICAN  
SCIENCE,  
1846-1876**

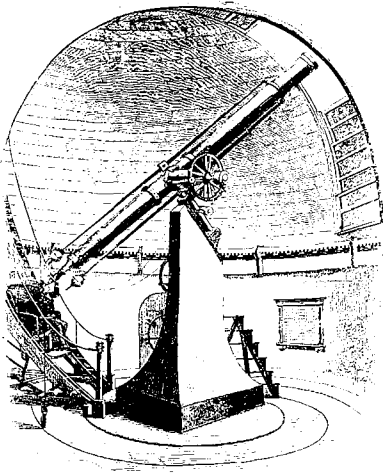
by Robert V. Bruce  
Knopf, 1987  
434 pp. \$30

Early practitioners of science in America were, in the best sense of the word, amateurs—often notable statesmen as well as gifted *savants*. American products of the 18th-century Enlightenment probed the natural world confident that informal research would uncover its underlying laws. Thus Benjamin Franklin experimented with his kite during lightning storms to demonstrate the fluidity of electricity, while Thomas Jef-

ferson studied and catalogued American plants and animals, refuting the theory that they were inferior to European species.

Such early endeavors—isolated, sporadic, eclectic—had little organized support in the country as a whole. Indeed, few colleges in the United States offered regular courses devoted to scientific training until Yale founded the Sheffield Scientific School in 1846.

Only by mid-century did American science begin acquiring an institutional base. National pride and enthusiasm for collaboration combined—in three short decades—to create museums, colleges, and government agencies necessary for a solid scientific establishment. Bruce, historian emeritus at Boston University, frames his account of this rapid evolution with the 1846 founding of the Smithsonian Institution on the one side and the Centennial Exhibition of 1876 in Philadelphia—which displayed crude telephones and electric lights to a curious public—on the other.



Nineteenth-century Americans distrusted their century's penchant for easy generalizations, seeking rather to collect all possible data before forming conclusions. They launched far-flung investigations: American astronomers observed the stars from locations at home and in Latin America; meteorologists used local observers to produce nationwide weather surveys; the United States Coast Survey gathered data on sea currents and depth sounding; and Congress sponsored major expeditions to map the Earth's topography and document the world's flora and fauna.

As Bruce points out, science—a risky career choice in the America of the 1840s—gained remarkably in status and visibility thereafter. Along with a growing number of teaching and government jobs, new free-lance opportunities emerged. A geologist could earn excellent pay for his advice on a (successful) mining venture, for example, and so could a chemist analyzing soil for farmers. Yale's chemist and mineralogist Benjamin Silliman, Jr., occasionally supplemented his teaching salary by working for the business community. He received \$526.08 for discovering how to “crack” petroleum, spanking that infant industry, as Bruce reports it, into “lusty, squalling life.”

The acknowledged chief of this growing scientific community was Alexander Dallas Bache, the genial, shrewd great-grandson of Benjamin Franklin. As superintendent of the Coast Survey—a position of great practical importance to a seafaring nation—Bache organized a small, private society of scientists, who named themselves the Lazzaroni: scientific “vagabonds.” The group included Joseph Henry, the Smithsonian Institution's dignified and politically astute secretary from 1846 to 1878; Swiss-born Harvard naturalist Louis Agassiz, whose 1846 zoology and geology lectures before the Lowell Institute in Boston gained national attention; Harvard mathematician and astronomer Benjamin Peirce; and Harvard chemist Oliver Wolcott Gibbs.

In lively—often sarcastic—correspondence, at private gatherings, and through the American Association for the Advancement of Science (founded in 1848), the Lazzaroni argued for more government-sponsored research and support for higher education, museums, research centers, and national associations. Most scientists outside this self-styled “fellowship” shared these goals. But who was most deserving? What were the national priorities? How should science best promote its cause?

Such questions often stirred up bitter personal rivalries, leaving the squeamish in the dust. Joseph Leidy (1823–91), who proved that a species

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of horse had evolved and then disappeared in North America, quit the field of vertebrate paleontology when he saw how, in Bruce's words, his "better-heeled and smaller-souled rivals," Othniel C. Marsh and Edward D. Cope, wrangled shamelessly over new dinosaur finds in the West.

"American science," asked the *New York Times* in 1860, "is there such a thing?" The answer, clearly, was yes—but U.S. scholarly journals were generally ignored in European scientific circles, and Americans got little recognition for their successes.

In 1861, the outbreak of the Civil War slowed the remarkable progress of the two preceding decades. Despite ready access to federal subsidies for research related to weaponry and transportation, "wherever the war touched individual scientists," Bruce observes, "it hurt them." University staffs were thinned by the call to arms. In the South, scientific study would not regain its former prominence for many years to come.

In the North, too, as Harvard's Agassiz complained, promising young scientists went off to war, preventing him from maintaining his zoology museum's "proper activity." In 1863, Bache and several of his colleagues did manage to create the National Academy of Sciences, formally mandated by Congress to advise the government on military and political matters. But the government never consulted the Academy on anything of consequence thereafter.

After the Civil War, notes Bruce, American science faced new kinds of opposition. Religious hostility to Darwinism flared up, and the public's identification of science with technology presumably repelled "those of a more romantically vague temperament." Writing in 1866, novelist William Dean Howells called science "the coldest element in our civilization."

Of the original Lazzaroni, only Oliver Wolcott Gibbs was still alive to see the first American (physicist Albert Michelson) win a Nobel Prize in 1907. Although the inspiration for U.S. advanced study and research laboratories came from Europe, concludes Bruce, it was this small but imaginative crew at the helm of American science from 1846 to 1876 who developed organizations that could survive the erratic crosswinds of public opinion in a democratic society, and set the course that led to American supremacy in nearly all the practical and theoretical sciences.

—Sally Gregory Kohlstedt '86