

## TECHNOLOGY AND CULTURE

certain individuals and institutions hold center stage, the author presents a wide range of characters as influencing the development of India's technoscientific capabilities in general and nuclear power in particular.

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The result is an authoritative study of the social history of science in India and the transmutation of technoscientific culture that has made India what it is today. That the monograph has twenty-five chapters demonstrates the intensity of research. (If the author could have merged a few of them, it would have been more enjoyable for the readers.) We do miss a detailed bibliography after such an interesting journey, and the publisher should think to convert the endnotes into footnotes to quench the immediate thirst and to correct a few mistakes (p. 37—Ronald Ross was born in India in 1957; p. 48—Delhi, India's capital after 1922).

Very few scholars have ventured into the post-independence history of science in India, and Anderson's excellent work is a welcome addition to a too-short list. In *Nucleus and Nation*, he has presented the political history of India along with the contemporary foreign policy issues, and to some extent captured the economic dimensions as well. Its detailed analysis of the shaping of the scientific and technological infrastructure of a nuclear India, based on immense archival materials and interviews, makes this book an invaluable resource on the culture, goals, and institutions of Indian science and the role of politicians in maneuvering scientific decisions.

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### **Nuclear Illusion, Nuclear Reality: Britain, the United States, and Nuclear Weapons, 1958–1964.**

By Richard Moore. New York: Palgrave Macmillan, 2010.  
Pp. xv+332. \$110.

The subject of this book, the first in chronological sequence of a series on nuclear weapons and international security, was aided by the release of archival material following the cold war. State secrecy is a powerful undercurrent, and the title evokes the contrast between what could be called political and technological perspectives on nuclear weapons that grew out of the requirement for secrecy. The focus is on the technological development of British nuclear weapons and the impact of United Kingdom, United States, and NATO policy on them. Its time frame is bracketed by the UK-U.S.A. cooperation agreement concerning mutual nuclear defense, signed in 1958, and the election of the Harold Wilson Labour government in 1964 after thirteen years of Conservative rule. Richard Moore argues that this period was crucial in defining Britain's defense policy for the following half-century.

## BOOK REVIEWS

Between the end of the Second World War and 1958, the United Kingdom had followed a lonely course, denied nuclear collaboration with the United States by its Atomic Energy Act and related security concerns. During that period, Britain had developed its own uranium and plutonium devices akin to the Hiroshima and Nagasaki weapons, amassed some fifty hand-built bombs, tested a single successful thermonuclear device, and had begun (barely) to configure the command and control infrastructure to support them. In this environment, posturing and rhetoric by politicians—who claimed the existence of a substantial deterrent and rational policy—conflicted with military reality. Over the subsequent six years, Moore suggests, the illusory aspects were amplified: some argued that Britain’s nuclear strength was neither independent, wholly British, nor a genuine deterrent. Indeed, as observed by Solly Zuckerman, chief scientific advisor of the Ministry of Defense, deterrence was a political construct.

This account focuses on two aspects of this story. The first concerns the political efforts to construct a credible defense policy, and the diplomatic interactions with the United States and NATO that eventually made it possible. The second aspect is policy execution, focusing on the development of nuclear technologies: the generation of fissile material for bombs, designs of nuclear warheads, delivery systems, and, just as important, the organization of the operating procedures that went with them. This split narrative mirrors the title, with the imagined political futures only loosely connected to the contemporary technological world. This linkage, perhaps the most interesting aspect for many readers of *Technology and Culture*, is usefully explored.

About a dozen photographs illustrate a sprinkling of British nuclear weapons, military commanders, and politicians, but this is a text-driven book full of information. We learn, for example, that Britain had produced some 2,500 kg of weapons-grade plutonium and some 7,600 kg of enriched uranium—the latter used in reactor research and submarine propulsion as well as bombs—by 1964. The United States and United Kingdom also bartered comparable quantities of fissile material to overcome shortages for particular weapons. British weapons programs included Blue Danube (its first atomic bomb), Red Beard (a tactical nuclear weapon), the canceled Blue Streak and Skybolt guided missiles, and Yellow Sun megaton weapons. The technological systems, involving explosive devices, delivery vehicles, military tactics, and perennially scarce fissile material, evolved together awkwardly. The yield-to-weight ratio was critical, for example, as was the range and accuracy of missiles and bomber aircraft and their tactical deployment during war.

The transnational connections are a newly revealed component of this story. Particularly interesting is the account of how warheads of American design were “anglicized” and produced in the United Kingdom to fill the

## TECHNOLOGY AND CULTURE

gaps in this far-from-stable system. The wide-ranging sharing of information via the various Anglo-American Joint Working Groups involved computer codes, fabrication technologies, radiochemistry, high-speed cameras, metallurgy, neutron sources, and numerous other subjects.

Overall, this book illuminates an important period of UK policy making and policy execution, revealing details, mechanisms, and motivations that once were shrouded. It is a worthy addition to the scholarly literature and will contribute to the reshaping of understandings of our nuclear heritage.

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### **Atomic Frontier Days: Hanford and the American West.**

By John M. Findlay and Bruce Hevly. Seattle: University of Washington Press, 2011. Pp.xiv+368. \$24.95.

John Findlay and Bruce Hevly offer a complex, multifaceted analysis of the Hanford nuclear site in *Atomic Frontier Days*. While the history of the Manhattan Project seems to be a well-trodden path, Findlay and Hevly demonstrate that much still remains to be studied regarding the bomb and American society. Their coauthored work effectively blends the history of the nuclear complex with the histories of environmentalism, community identity, regionalism, and politics in a book that spans Hanford's conception as a federal reservation up to the early 2000s. Few examinations of the nuclear-weapons production system have attempted such a large time period, and even those that do fail to present the layered, contextualized account told by Findlay and Hevly.

*Atomic Frontier Days* begins with World War II and the selection of the Hanford Engineer Works by the Army Corps of Engineers. The first chapter initially recounts well-known tales of Hanford's wartime service, the pioneering spirit that permeated the site, and the sense of sacrifice by all involved. The twin concepts of national sacrifice and pioneering spirit are themes the authors frequently touch on throughout the book. Findlay and Hevly do not stop their study of Hanford at the war's end, however; instead they carry the story forward to look at the expansion of production at Hanford during the cold war. Here, the authors note that while federal and contractor employees liked to view the site as being on the cutting edge of science, much of Hanford's nuclear technology quickly became obsolete.

The site's commitment to the nation's defense turned Hanford into a sacrifice zone, according to the authors. Not only was Hanford a likely target of Soviet warheads, but the scale and type of industrial pollution gen-