

ories, assessing the evidence in debates on homosexuality, pornography, and childhood sexuality (and lamenting the impossibility of doing serious research on children). An advocate of frankness in all sexual matters, he writes unflinchingly of pedophiliacs and “fuckeramas” (video workshops employed to desensitize therapists) (p. 279). He is admirably feminist and altogether nonjudgmental. What Bullough does not do, however, is historicize his—the sexologist’s—commitment to the notion that sexual openness yields the researcher essential truths of human nature. This notion, upon which sexology is premised, is not nearly so self-evident as Bullough assumes. Advanced by turn-of-the-century sexual modernizers, it triumphed as part of the process that saw a Victorian past created and rejected. Rooted in history, it invites the historian’s scrutiny.

ELIZABETH LUNBECK

Leland Johnson; Daniel Schaffer. *Oak Ridge National Laboratory: The First Fifty Years*. xii + 270 pp., illus., bibls., index. Knoxville: University of Tennessee Press, 1994. \$30.

Because of its origins in the Manhattan Project, the Oak Ridge complex remains identified with nuclear weapons and energy research. As the authors of this volume emphasize, however, the laboratory has pursued a much broader agenda and has long represented a multifaceted scientific institution. Its nuclear program has been augmented by research in various biological topics, energy conservation, science education, and, more recently, environmental recovery and waste management. Although “sponsored” by Oak Ridge National Laboratory and occasionally displaying the shortcomings of “in house” history, this overview of the laboratory’s first half-century describes the multidimensional research program of Oak Ridge.

The end of World War II began a significant transition in the role and mission of the laboratory. During the late 1940s reactor design projects, isotope production for medical research, and the expansion of the basic science program defined the laboratory mission. The escalation of the cold war and Eisenhower’s Atoms for Peace initiative further expanded the role of Oak Ridge. The laboratory staff doubled in size and pursued such programs as boiling-water reactors for civilian power production, reactors for submarine propulsion, research in genetics and medicine, nuclear fusion, and the investigation of various environmental topics.

As the Atomic Energy Commission increas-

ingly called for “balance” in the national laboratories during the 1960s, Oak Ridge moved more dramatically away from its earlier focus on nuclear energy. The biology division became the largest division of Oak Ridge National Laboratory and examined a wide variety of research questions. Although the environmental and biological programs of the laboratory continued during the 1970s, the energy crisis returned Oak Ridge to its earlier focus. Laboratory scientists investigated recycling efforts, solar energy, nuclear fusion, and the use of coal as an energy source, while continuing their research on nuclear safety and environmental concerns.

The Reagan revolution brought another significant modification to the laboratory’s mission. Although Oak Ridge participated in Strategic Defense Initiative endeavors, the more significant change in the 1980s was a redirection of energy research. Support for non-nuclear energy sources and conservation dropped noticeably, while the Reagan administration stressed technology transfer to private industry. In the early 1990s the laboratory took on the new task of environmental restoration. Various reviews had disclosed major environmental problems at nuclear facilities, most of which resulted from earlier techniques of nuclear waste disposal. Rather than pursuing new projects, many Oak Ridge scientists found themselves attempting to correct past mistakes. The expansion of the laboratory’s mission continued, however, with other scientists involved in global warming studies, the human genome project, analysis of acid rain, and preliminary work on the superconducting supercollider.

Based on numerous interviews, various published sources, and selected manuscript and archival collections, *Oak Ridge National Laboratory: The First Fifty Years* provides a valuable survey of the development of this facility. Its value as a historical account is somewhat limited by the lack of footnotes or other citations, but as a descriptive overview the volume makes an important contribution and provides an outline for more detailed studies.

GEORGE E. WEBB

Jonathan M. Weisgall. *Operation Crossroads: The Atomic Tests at Bikini Atoll*. xx + 415 pp., frontis., illus., figs., app., bibl., index. Annapolis, Md.: Naval Institute Press, 1994. \$31.95.

The island of Bikini is at the center of this meticulous reconstruction of the weapons tests conducted there. Jonathan Weisgall has been legal counsel to the Bikini islanders since 1975, and



Sailors scrubbing the deck of the Prinz Eugen to reduce radiation levels after Operation Crossroads. The ship had been part of the "target fleet" in the 1946 atomic bomb test at Bikini Atoll (reprinted from Weisgall, Operation Crossroads).

his narrative is most compelling when it stays close to the islanders. There is barely an analytical sentence in the book, and the author is prone to harsh adjectives for those who promulgated the tests. But the storytelling is first rate, and Weisgall has done more than his share of combing archives and dissecting oral history interviews.

Weisgall's account focuses on a fifteen-month period, from August 1945 to November 1946, during which Operation Crossroads was conceived, defended, carried out, and then assessed as proving that if an atomic bomb came close enough to a ship, the ship would sink. Lewis Strauss, later chairman of the Atomic Energy Commission, dreamed up the idea in August 1945 that atomic bombs should be tested on the navy's fleet, in order to prove the continuing importance of a sea power in modern war. From this beginning, Crossroads grew into a massive military exercise (an extravaganza, as the author puts it) that involved more than forty thousand military and civilian personnel, hundreds of sup-

port ships, and the planned destruction of ninety-five target ships valued at either \$4 million or \$400 million, depending on whose testimony can be believed.

Drawing on extensive government archives and on the personal papers of scientists and political leaders involved in these events, Weisgall documents the decision-making process through which this phenomenon came to be. He shows that the Crossroads tests were a consequence of rivalries between the army air force and the navy, that they had very little scientific value, that they were a public relations disaster, and that they threatened the fragile negotiations then under way for the control of atomic energy. He also examines the events at Bikini from many different perspectives, considering the experiences not only of the islanders, but also of military crews and of the hundreds of journalists and photographers on the scene. Weisgall has also tracked down wonderful material on popular culture and Bikini, and he uses these sources to good effect throughout the text.

This is, in other words, a grand narrative of a type that is not fashionable but can be of value when you need information. Weisgall occasionally makes problematic claims—for example, that the health risks posed by exposure to radiation were unknown in 1946—but his book is a good resource for those interested in the management of atomic weapons in the immediate postwar era.

SUSAN LINDEE

Allan M. Winkler. *Life under a Cloud: American Anxiety about the Atom.* [iv] + 282 pp., bibl., index. New York/Oxford: Oxford University Press, 1993. \$27.50.

Allan Winkler has written what could be called a second-generation history, integrating a vast amount of material previously published. The result is a concise, readable work that presents a broad history of the politics of nuclear weapons and energy in the United States, structured around the basic theme of the relationship between public activism and government policy. Apart from brief flashbacks to the earlier history of radiation, the book begins with the Manhattan Project and continues up to the breakup of the Soviet Union. The chapters, while organized topically, for the most part also follow a chronological order. This provides both a conceptual clarity to each chapter and an overall unity to the entire book. Topics include the formation and operation of the Manhattan Project, the postwar debate over the creation of the Atomic Energy Commission, the postwar debate over international control of atomic energy, the dual development of nuclear weapons and the strategic theories of their use, the debate over fallout, the civil defense program, the Atoms for Peace program and the development of nuclear power, attempts to control the arms race by treaty, and the debate over Reagan's Star Wars proposal. The impressive accomplishment of the book is to present a history that covers so many topics without losing readers in a sea of detail or boring them with generalities. Throughout, the book provides narrative detail to bring the story to life, while retaining a sense of direction in both chronology and basic theme.

The book has two aspects that some might regard as weaknesses, others as blessings. First, while the underlying theme is the relationship between public protest and official policy, the book does not propose a distinct sociological model of this process. Some social scientists may thus find it weak analytically. Second, it

presents few details of the scientific and technical issues involved in the topics covered. Although the political role of various scientists is discussed at length, science itself appears as a force in the general culture but is not dissected to examine how its own ideas were influenced by that culture.

Finally, as noted earlier, *Life under a Cloud* is drawn primarily from published sources; scholars will not find any new discoveries here. The book is, however, an excellent choice for courses on science and society. It is well written and does not presume any prior knowledge of science or American history, providing useful background on the politics of the period. The excellent bibliography provides students with a useful starting point for independent research.

GILBERT WHITEMORE

Allan Franklin. *The Rise and Fall of the Fifth Force: Discovery, Pursuit, and Justification in Modern Physics.* viii + 141 pp., illus., figs., tables, bibl., index. New York: American Institute of Physics, 1993. \$29.95.

In the absence of air resistance, all objects—regardless of their composition—fall with the same uniform acceleration. This principle, discovered by Galileo, became a cornerstone of Newtonian mechanics. Near the beginning of the twentieth century, Baron Roland von Eötvös and collaborators tested Galileo's principle with a sensitive torsion balance and reported that it was obeyed to high precision, and subsequent experiments agreed: different particles placed in the same gravitational field acquire the same acceleration. These results demonstrate the equality of inertial and gravitational mass, and on this rests Einstein's equivalence principle, the foundation of general relativity and all other "metric" (curved-spacetime) theories of gravity.

Eötvös's important experimental data went unchallenged until January 1986, when Ephraim Fischbach and Carrick Talmadge (Purdue University), Sam Aronson (Brookhaven National Laboratory), and two junior collaborators published an eye-catching paper in *Physical Review Letters* that argued for the possible existence of a new fundamental force in nature, to add to the four forces (gravitational, electromagnetic, weak, and strong) already known. This "fifth force" would have an effective range of a few hundred meters; it would be a repulsive force; its strength would be about 1 percent that of gravity and would be, for a given substance, proportional to baryon number (or hypercharge).