Book Reviews

A Survey of Scholarship

Historical Writing on American Science. SALLY GREGORY KOHLSTEDT and MARGARET W. ROSSITER, Eds. History of Science Society, Department of History and Sociology of Science, University of Pennsylvania, Philadelphia, PA, 1985. 231 pp., illus. Paper, $29. *Osiris*, second series, vol. 1.

Judging by the several essays in this first volume of the revived *Osiris*, the history of science in this country is a vibrant, complex field of scholarship that is generating ideas that should interest a very wide range of readers. Specialists in a number of subdisciplines will be able to compile from these selections excellent reading lists in subjects ranging from institutional history to the histories of astronomy, biology, and physics. The federal government's role in science is treated, as is the relationship between science and war. Experts in each of these areas of inquiry will, I think, find ideas of interest. The essays will also be a treasure trove for graduate students preparing for their general exams or designing dissertation projects. But actually the book's chief market should be among nonspecialists like myself—those of us who are consumers (instead of producers) of science and technology and their respective histories.

Readers of that ilk will not be disappointed with *Historical Writing on American Science*, although they will discover some essays that needed stronger direction from the volume's organizers and a few that could have benefited from one more pass by a good copy editor. The best of the essays are by contrast unusually well written and carefully reasoned. Among those on Classical Themes, John Harley Warner on "Science in medicine" provides his readers with a good sense of the structure of that field of inquiry, with a review of the literature, and with a strong evaluation of what distinguishes the best work (for example, recognition of the multiple meanings "science in medicine" can have) from the worst (which considers modern medicine to be the only kind touched by science). Ronald L. Numbers mounts a similarly enlightening excursion through "Science and religion." He too finds complexity in the past; as he notes, historians have replaced the outdated imagery of intellectual warfare with a newer, less simplistic, less static concept of two social entities that were both evolving and were seldom in simple opposition. Conflict existed, Numbers says, but it was merely one small part of a larger process of change.

Among the several chapters under the heading Science in Specialties those by Mott Greene on the history of geology, John Servos on the history of chemistry, and Hamilton Cravens on the history of the social sciences stand out most clearly. Greene emerges as a crusty, judgmental scholar with a fine prose style and a laudable wit: he condemns "antiquarian excesses of numbing triviality" and points out that one formidable publication in his field is "united only by the conjunction of the nouns of its title" (pp. 107 and 108). Along the way Greene provides us with a rich analysis of what has been and what could be accomplished in a subdiscipline that most obviously does not fit the template of either the history of physics or the history of biology.

John Servos has a similar problem with chemistry, a field overshadowed by "the more glamorous disciplines of physics and biology." Still, as Servos demonstrates with commendable insight, significant progress has been made in recent years in charting the history of the discipline and its ties to America's social and economic institutions. Here as elsewhere in the history of science most scholars opt either for an emphasis on ideas or for an emphasis on social systems, but Servos finds several examples of research that blends internalist and externalist concerns and provides a model for work in this new and developing field.

Both Servos and Cravens stress developments prior to the Second World War. Indeed most of the authors follow that course (with the notable exception of Margaret W. Rossiter, who writes specifically on "Science and public policy since World War II"). Cravens further restricts his scope, concentrating on anthropology, sociology, and psychology, to the detriment, for instance, of economics. Within those limits, however, he performs the heroic task of synthesizing a subject that he admits has not yet "gelled intellectually" (p. 185). He shows how the emerging social sciences provided new concepts of the group and of its relationship to the individual. In effect his essay—as do several of the others I have mentioned—provides a capsule intellectual history of his subject matter, a framework that gives meaning to the literature and points the way to future research.

Two of the selections labeled "newer areas" were especially valuable to me. One is Clara Sue Kidwell's sensitive exploration of "Native knowledge in the Americas." Hers is an almost impossible undertaking. Scholars in this subdiscipline must deal with the prejudices most of us have about the sharp distinctions between modern science and premodern cultures—a set of biases that Kidwell carefully dissects. Moreover, the literature is sparse and, for the most part, of very recent origin. Nevertheless, she provides us with an intriguing review of what has been learned to date in such areas as ethnobotany and archeoastronomy, two scholarly enterprises I barely knew existed before reading her chapter. George Wise, writing on "Science and technology," has a different problem. His subject matter has been unified around one of two major theories: "The policy makers based their policies on a simple but incorrect model, while the historians began to gather the pieces for a new model not yet built" (p. 229). The outdated theory portrayed an assembly line, with science at the front, followed by technology. Innovations rolled off the line so long as there was plenty of science to start the process going and enough technologists to make full use of the scientists' ideas. Now, Wise says, we know better. We have learned from Thomas Hughes, Hugh Aitken, Edwin Layton, and others that technology consists of ideas as well as artifacts, that technological theory plays a crucial role in the process of innovation, and that technical social systems can acquire momentum and can define the problems that engage scientists as well as technicians. As yet, however, the historians have not pulled these ideas together to constitute a model as simple and appealing as the old assembly line theory. Hence policy continues to be framed in terms of an outmoded linear model, while the best historical research develops an entirely different perspective.

As this brief review of the essays by Wise and others suggests, complexity, not some single, powerful synthesis, is the order of the day in the history of science (as it has been in American historiography in general since the 1940's). The discipline has produced an abundance of outstanding interpretative works that provide focal points for analysis and evaluation. But leaving aside the methodological struggle between the internalist and externalist schools—science as a series of ideas vs. science as social system—the history of science has not generated a compelling model that can synthesize the developments in the different disciplines, in the government, and in the nation's universities and corporations. Such a paradigm may not be needed. On the evidence of this useful volume one can conclude that brilliant work can be done in the absence of an overview or synthesis. Still, that leaves this consumer dissatisfied and longing for the sort of interpretative structure that would enable us all—specialist and non-specialist as well—to find in the history of American science some

single, central meaning. Certainly if this new volume of *Osiris* is an accurate guide—and I believe it is—we already have at hand an abundance of carefully researched monographs with which to build such a conceptual edifice. All we need is a scholar to undertake the construction, and several of the authors of these essays are, I know, fully capable of that demanding task.

LOUIS GALAMBOS
Department of History,
Johns Hopkins University,
Baltimore, MD 21218

Hopes and Fears

By the Bomb's Early Light. American Thought and Culture at the Dawn of the Atomic Age. PAUL BOYER. Pantheon, New York, 1985. xx, 441 pp., illus. $25.

By the Bomb's Early Light is a rich account of the impact of the atomic bomb on American culture between 1945 and 1950. Paul Boyer, a historian from the University of Wisconsin, has drawn on a wide variety of sources—archival documents, public opinion polls, interviews, cartoons, novels, poems, songs—to show how fully the bomb became part of American life in the period immediately following the Second World War.

Boyer's book deals with uncharted territory. Scholars have studied the decision to drop the atomic bomb, the escalating arms race that resulted after the first Soviet detonation in 1949, the diplomatic confrontations that have followed, and the strategic arguments that have reverberated in policy-making circles in the past 40 years. But no one, until now, has attempted to understand just how Americans, at all levels, have been affected in their own lives by the bomb. "If a scholar a thousand years from now had no evidence about what had happened in the United States between 1945 and 1985 except the books produced by the cultural and intellectual historians of that era," Boyer writes, "he or she would hardly guess that such a thing as nuclear weapons had existed." With the appearance of his book, the role of the bomb in America becomes far clearer.

Boyer's main point echoes the comment of Anne O'Hare McCormick in the *New York Times* on 8 August 1945 that the bomb caused "an explosion in men's minds as shattering as the obliteration of Hiroshima." In his own phrase, "Hiroshima bisected history." At all levels, in all ways, Americans had to confront a startling new force, and Boyer is intent on proving that "the bomb's larger impact on culture and consciousness

"Healed by atomic energy. In this photo montage from a May 3, 1947, *Collier's* article on the atom's medical promise, a recovered paraplegic emerges smiling from a mushroom cloud, his abandoned wheelchair in the background." [From *By the Bomb's Early Light*]

demands more attention than it has received."

Early chapters deal with the first reactions to the bomb, as the public became aware of what had happened at Alamogordo, Hiroshima, and Nagasaki. Entrepreneurs of all sorts seized upon the atomic vocabulary. The Washington Press Club offered an "atomic cocktail" made from Pernod and gin. The music industry presented such songs as "Atom Polka" and "Atom and Evil." Boyer then goes on to describe in detail the fears that scientists felt as they considered what had occurred. He shows how the bomb caused a crisis in moral values, as religious leaders questioned what had been done. And he notes how government officials and private promoters sought to use arguments for the peacetime benefits of the atom to offset the more grim nightmares of the atomic age.

Boyer suggests that there was a genuine dialogue in American society in the first years after 1945. By 1950, however, "the cultural discourse had largely stopped." Americans seemed readier to embrace, or at least accept, the bomb; it became an important weapon in the context of the Cold War. Hopes came to outweigh fears. Efforts to confront the harsher realities had to await another day.

By the Bomb's Early Light is an impressive work of scholarship. Boyer has a judicious eye for quotation, and he integrates all of his materials into a fascinating story that covers the reactions of all kinds of Americans, from religious and professional leaders, to government officials, to ordinary citizens who occasionally made their voices heard. He upholds the historiographic standards he has applied in previous works that have nothing to do with atomic affairs, yet his book is at the same time a highly personal work. Boyer records his own first perceptions of the bomb in 1945, describes his atomic viewer ring provided by the Kix Cereal company, recalls his reactions to the film "On the Beach." He notes how that background led him to this project, and tells us of his hope that his account can contribute "to the process by which we are again, at long last, trying to confront, emotionally as well as intellectually, the supreme menace of our age."

Occasionally the book seems a trifle repetitive. Examples found in one chapter reappear later as Boyer takes up a somewhat different theme. The book sometimes seems to go over similar territory as Boyer moves from one group to the next. Yet the effort to deal with cultural impact at all levels is the strength of the book as well, and the detail makes a difference in the story he tells. *By the Bomb's Early Light* is the superb account of the origins of contemporary hopes and fears, protests and dreams.

ALLAN M. WINKLER
Department of History,
University of Oregon,
Eugene, OR 97403

Evidence about Evolution

Evolutionary Case Histories from the Fossil Record. J. C. W. COPE and P. W. SKELTON, Eds. Palaeontological Association, London, 1985. 203 pp., illus. Paper £30. Special Papers in Palaeontology, 33. From a symposium, Swansea, Dec. 1983.

The last ten years have seen an explosive increase in the attention paid to questions of the mode (or modes) of evolution, both in professional journals and in the popular press. The relative importance of constraints (developmental, historical, and morphological) and natural selection in evolutionary processes, the causes of mass extinctions and their effects on evolutionary history, and the mechanisms of macroevolution (that is, the evolution of grades of organization higher than species) have all achieved new prominence and respectability. The goal of this collection of papers was to test these theoretical arguments about the evolutionary process against the data provided by the fossil record. As in most symposium volumes, the papers are uneven in both cover-