tory, largely conceived (1770–1970). The book mentions related developments in China and India as seems appropriate.

By focusing on founders of scholarly institutions rather than on scholarly accomplishment, McNeely and Wolverton create an unusual intellectual pantheon. One reads of the librarian Demetrius of Alexandria rather than Euclid or Ptolemy, the importance of the rules of monastic living attributed to Benedict of Nursia rather than any scholarly monk, Galileo's correspondent Nicholas Peirsac as much as Galileo himself, and Vannevar Bush as a twentieth-century organizer and visionary as much as any computer designer or scientist.

As one might expect for a book with such a broad scope, specific historical statements sometimes raise questions. The first chapter has as an introductory image showing a bust of a classical scholar. The figure caption begins "Demetrius of Phaleron, probable founder of the library at Alexandria . . ." (p. 2). The text itself then describes the appearance, political intrigues, and sexual proclivities of Demetrius, the "man who founded the most famous library in the Western world" (p. 3). Considering the paucity of reliable information about ancient figures, I would have liked to have a better sense of whether Demetrius is best regarded as a "probable founder" of the library at Alexandria or as a definite historical actor at that library.

A second example of uncertainty in evidence comes toward the close of the book, when the authors give a quick summary of the history of the computer. Two breathless sentences here read: "The term 'computer' originally referred to women enlisted during World War II to perform tedious ballistics calculations by hand, then set to work maintaining behemoths like the ENIAC, the first digital computer, which ran calculations for the H-bomb. True to the artisanal traditions of the laboratory, Captain Grace Hopper and Lois Haibt graduated from the scut work of replacing vacuum tubes to the design of advanced programming languages like FORTRAN and COBOL" (p. 266). A quick check of the *Oxford English Dictionary* reveals that people doing calculations have been referred to as "computers" from the seventeenth century. Whether the ENIAC was the "first digital computer" is a matter of historical and legal dispute. Grace Hopper left her position as a mathematics professor at Vassar College during World War II to work on programming the ASSC Mark I computer at Harvard. The machine had no vacuum tubes; she was hired as an ensign in the U.S. Navy; and she worked on programming from the start. Haibt was hired by IBM in 1955 on her graduation from Vassar and went straight to work on the development of FORTRAN—no scut work with vacuum tubes required. There were indeed women who worked as operators of early computing machines who went on to make important contributions to early computer programming, but the authors have not bothered to look at sources carefully enough to identify them.

McNeely and Wolverton argue that the advent of new institutions for preserving knowledge tends to displace old ones. Indeed, they reach the bold conclusion that "the laboratory and the disciplines stand as the only remaining knowledge institutions, not only in America but across the globe" (p. 270). This claim gives short shrift to the continuing role of libraries (and perhaps even museums) in the preservation of knowledge in such areas as science, mathematics, and the humanities. It also ascribes a primacy to secular, academic knowledge that may not be as universally acknowledged as the authors suggest.

In summary, *Reinventing Knowledge* is a wide-ranging, provocative attempt to provide a framework for understanding human institutions for the accumulation of knowledge. Though not always persuasive in detail, the book draws attention to historical issues of great importance to the learned professions.

PEGGY ALDRICH KIDWELL

Lisa Nocks. *The Robot: The Life Story of a Technology*. xxx + 192 pp., illus., bibl., index. Baltimore: Johns Hopkins University Press, 2008. $19.95 (paper).

The Robot attempts to present a comprehensive history of robotics, beginning from its origins in the rituals of the ancient Egyptians, the belief that wealthy individuals could bring slaves to work for them in the afterlife, and the evolution from burying human slaves to burying iconic statues (*shabti* and *ushebti*) and, eventually, drawings. The book opens with a timeline of events that foretells its overall structure. The chapters are arranged in chronological order, except where subfields are reviewed independently. There are three main sections, "Ancestors," "The Early Years," and "Growth of the Field," with two chapters per section.

Lisa Nocks touches on many of the important events, inventions, ideas, inventors, and robots that make up this history but does not explore any in depth. Additionally, the linearity of the narrative yields a story of straightforward progress and a sense of inevitability. Apart from

the effort in the first chapters to derive a sociocultural motivation for the development of robots from ancient slave cultures and a desire for labor-saving devices, robotic technologies tend to appear *sui generis*. There are occasional gestures toward some external social issues, such as labor and health care, or political interests, such as warfare or space exploration, but these are in need of further examination as to how they influenced the history of robotics. The book's brief conclusion raises several critical questions and issues for future work, but *The Robot* falls short of providing a conceptual analysis of the life story of robotics, either as history or as technological phenomenon.

Furthermore, the conceptual definition of robotics that is employed is problematic. What distinguishes a robot from other automated assembly-line technologies? "The central feature is the *manipulator* or arm" (p. 71), according to Nocks. Yet numerous robots without manipulators are described, such as mobile robots and face robots. "The second feature is the *controller*" (p. 72), which implies that tele-operated devices are not robots because they lack any preprogrammed functionality. Yet several are later described. This highlights an issue facing the history of robotics: while we commonly group together many different ideas, objects, and technologies as "robotic," there is not necessarily a common conceptual or historical thread linking them all.

There are some unfortunate factual errors in the text, but without citations or footnotes it is impossible to track them to their source. For example, the book claims that Arturo Rosenblueth, Norbert Wiener, and Julian Bigelow coined the term "cybernetics" in 1943 (p. 60); but while they wrote one of the foundational papers that year, by his own account Wiener did not coin the term until 1947 (Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine* [Wiley, 1948]). *The Robot* also states that the EDVAC was built at the Institute for Advanced Study at the University of Pennsylvania (p. 64)—an apparent conflation of the EDVAC, built at the Moore School of Engineering in Pennsylvania, with John von Neumann's machine that was built at the Institute for Advanced Study in Princeton.

What distinguishes this book from others is its attempt to cover the long history of robots, as well as to take the time to explain how many of the technologies actually work. In terms of the recent history of modern robotics, there is no definitive text—and so this book promises to fill a significant gap. Popular books by leading roboticists (such as Rodney Brooks and Hans Moravec) tend to describe only the history that influenced their own work. Other popular books tend to be rather journalistic, looking only at robots as they have appeared in the mass media. John Cohen's *Human Robots in Myth and Science* (Allen & Unwin, 1966) provides a more rigorous overview of the fictional history of robots, including insights into the golems of Hebrew folklore, the bronze-head myths of Enlightenment Europe, and the wooden- and metal-man myths from India and China, all of which are absent here. Also missing is any discussion of the numerous phototropic mobile robots developed in the early twentieth century, described in Roberto Cordeschi's *Discovery of the Artificial* (Kluwer, 2002).

In summary, this book is a concise introductory overview of the history of robots. It is written at a level accessible to undergraduates and contains enough material that even experts are likely to encounter something new. The best audience for it will be those who want a quick introduction to the history of robotics before diving into the details or big ideas.

PETER ASARO

Josep Simon; Néstor Herran; Tayra Lanuza-Navarro; Pedro Ruiz-Castell; Ximo Guillem-Llobat. *Beyond Borders: Fresh Perspectives in History of Science.* vii + 377 pp., bibl., index. Newcastle: Cambridge Scholars Publishing, 2008. $39.99 (cloth).

Beyond Borders is a collective volume edited by a group of five young scholars from Spain. It comprises nineteen contributions from thirteen authors, including the editors, all recent Ph.D.'s or graduate students, mostly working in Barcelona but also in Germany, Greece, Italy, Finland, and Peru. Many of them are members of the international group STEP (Science and Technology in the European Periphery). The book is organized in five parts: "Geographies of Knowledge in Early Modern Europe," "Communicating Science and Technology," "Popularization of Science," "Science and Nation," and, finally, "Science in the Periphery." Each part includes an illuminating essay offering a comparative and historiographical introduction to the topic under scrutiny. There is a very good selected bibliography in the end.

Having had as its starting point a postgraduate conference held in Valencia in 2006, the book is much more than a proceedings volume. The inspiration behind it is reflected in the diversity of topics—from astrology and mixed mathematics to mathematics, physics, astronomy, genet-