not deliver) a welcome degree of academic recognition, as the scientific community had long been asking for such a posthumous edition. The work has been translated into English by E. G. Forbes as *Tobias Mayer's Opera Inedita: The First Translation of the Lichtenberg Edition of 1775* (London, 1971).

The lectures on electricity are the most important to historians of science as well as to Lichtenberg himself. The first provides a description of the serendipitous discovery of the discharge patterns now known as Lichtenberg figures and of related experiments. The second lecture adds theory to practice by explaining the observed phenomena in light of the differing theories of electricity. Although he privately preferred Robert Symmer's two-fluid theory to Franklin's single-fluid hypothesis, Lichtenberg refused to commit himself in public; instead, he emerged as an early and adamant champion of the symbols + and −, precisely because they could be explained in terms of both theories (that is, + could refer either to a positive fluid or to a surcharge of a single fluid). That position is Lichtenberg in a nutshell: throughout his life, he advocated the use of symbols that are not exclusively linked to one theory. Almost two decades later, in his critique of Lavoisier, he repeatedly claimed that the new chemical terminology devised in France had nothing to offer that was on a level with + and −.

As the editor, Dag Hasse, notes, Lichtenberg belonged to the last generation of German scholars who made use of Latin for the purpose of transnational communication, but given that Latin all but disappears from his writings after 1780, one might also say that he belonged to the first generation that no longer employed it. This fact will come as a relief to today's readers, as Lichtenberg's style tends to exhibit some of the convoluted meandering typical of late eighteenth-century German Latin, the convolutions exacerbated by his tendency to reproduce the complex rules of German syntax. This intricacy, however, had nothing to do with stylistic vanity; it was expected. Lichtenberg knew that his audiences were more familiar with Quintilian than with quadrants and that, consequently, they would tolerate minor mathematical mistakes or experimental blunders but would be quick to condemn any inferior display of Latin.

GEOFFREY WINTHROP-YOUNG

Patrice Bret. *Lavoisier et* l'Encyclopédie méthodique: *Le manuscrit des régisseurs des poudres et salpêtres pour le* Dictionnaire de l'artillerie *(1787).* (Biblioteca di Nuncius, Studi e Testi, 28.) 202 pp., illus., tables, app., bibl., indexes. Florence: Leo S. Olschki, 1997. L 40,000 (paper).

In this book Patrice Bret presents previously unpublished manuscript documents relating to the *Dictionnaire de l'artillerie* of the *Encyclopédie méthodique*—the successor to the *Encyclopédie* of Denis Diderot and Jean d'Alembert—launched by the publisher Charles-Joseph Panckoucke in 1782. In contrast to its alphabetical predecessor, the *Encyclopédie méthodique* was organized according to subject matter; Panckoucke assigned topics to specialized authors who, under a succession of editors, composed approximately two hundred tomes over fifty years. Panckoucke enlisted the military officer François-René-Jean de Pommereul to write the volume on artillery. Pommereul in turn recruited members of the organization responsible for producing saltpeter and gunpowder at the end of the Old Regime in France, the *Régie des poudres et salpêtres,* to draft the sections of the text related to their activities.

The twenty-two articles prepared by the *Régisseurs* between 1787 and 1789 never appeared in the *Encyclopédie méthodique.* Bret has transcribed these writings with clear indications of textual changes and variations in the extant versions. Although the authors did not complete the work, the articles cover a range of materials, operations, instruments, and phenomena related to the manufacture of gunpowder, from alkali and assaying to milling and mother liquors. Jean-Baptiste-Paul-Antoine Clouet and Edme-Pierre Le Tors penned most of the entries. Antoine Laurent Lavoisier contributed long essays on charcoal, detonation, and saltpeter. Additional documents list the subjects projected for inclusion in the work, identify the men to whom topics were assigned, and reveal the contractual terms between the publisher and authors when the faltering enterprise was briefly revived in 1793.

In a fifty-five-page introduction Bret describes the provenance of the manuscript and its place in Panckoucke's encyclopedic project, summarizes the history of the *Régie* and the role of the authors in the institution, and analyzes the materials printed in the volume. His examination draws widely on archival holdings in France and the United States as well as published primary and secondary sources. As Bret persuasively maintains, the documents reveal the pursuit of objectives that were simultaneously scientific, strategic, economic, and social. Those who di-

rected saltpeter and gunpowder production in France turned to chemical theory and metrology in an attempt to augment production, discipline labor, reform bureaucratic procedure, and fortify the military power of the state.

But as Bret rightly notes, in spite of the presence of no less a scientist than Lavoisier, few productive gains resulted from scientific research. Bret adopts the explanation offered by Lavoisier and his cohorts: institutional blockages, uneducated artisans, and stubborn adherence to tradition everywhere stymied innovation. He thereby exemplifies the manner in which such texts advanced claims of scientific authority in the domain of manufacture, articulating the superiority of chemical knowledge over craft practice and established custom. Bret identifies the complex of changes that were entailed in the promotion of scientific investigation over the atelier: the recourse made to explanatory theories, instrumental measurements, and experimental demonstrations. The articles on assaying and the densimeter by Clouet, the ballistic pendulum by Le Tors, and charcoal by Lavoisier all exhibit a relentless effort to subject the workshop to instrumental rule linked to theoretical precepts and experimental determinations, revealing as well the legion of practical difficulties that often thwarted endeavors to calculate productive operations.

The attractions of this volume go well beyond the compass indicated by the title, which unfortunately gives undue prominence to Lavoisier. Scholars will indeed find compelling new evidence here for how the chemistry of Lavoisier intertwined with pressing geopolitical, economic, and social issues of Old Regime France. But the manuscript material will be useful for specialists studying a much wider range of historical subjects: the transit of scientific and technical literature into print, the connections between scientific theory and manufacturing practice, the rise of quantification, and the development of new relations among science, labor, industry, and the state.

JOHN DETTLOFF

Richard Helsham. *Lectures on Natural Philosophy.* Edited by **D. A. Attis, P. Kelly,** and **D. Weire.** 18 + x + 404 pp., illus., figs., tables, bibl. Reprint of 4th edition, 1767. Bristol: Institute of Physics; Bremen: Verlag MIT, 1999. $59, £35.

Richard Helsham (ca. 1682–1738) was a successful Irish physician and a member of a Dublin circle of Tory intellectuals that included Jonathan Swift and Patrick Delaney. Beginning in 1711, without either salary or official position, Helsham lectured on natural philosophy to medical students at the newly established school of medicine in Trinity College, Dublin. After thirteen years of service, he was appointed the first professor of natural and experimental philosophy at the college.

Helsham published a treatise on the use and misuse of tea and (anonymously) a political satire. But, like most of his colleagues at Dublin, the "silent sister" of Oxford and Cambridge, he devoted himself more to teaching than to writing. Helsham's *Course of Lectures in Natural Philosophy,* the result of many years of teaching his subject, was published posthumously in 1739 by his pupil Bryan Robinson. Seven further editions appeared up to 1802 at Dublin, London, and even Philadelphia. An abridged version was printed three times at Dublin between 1818 and 1834, and Helsham remained required reading for students at Trinity College as late as 1849.

Helsham's book has affinities with two separate genres. It was a part of the first wave of simplified accounts of Newton's natural philosophy. Earlier and better-known works in this genre include Willem Jacob 's Gravesande's *Mathematical Elements of Natural Philosophy Confirm'd by Experiments; or, An Introduction to Sir Isaac Newton's Philosophy* (1720), Henry Pemberton's *A View of Sir Isaac Newton's Philosophy* (1728), and Voltaire's *Elements of the Philosophy of Newton* (1738). Helsham's graceful introductory chapters on attraction and central forces, as well as his concluding chapters on light, vision, and colors, imbue his book with its Newtonian spirit.

But Helsham's book had this difference, that it was not addressed to the general enlightened reader but was written as an introduction for university students. So Helsham included detailed treatments of the lever, pulley, wheel, and wedge, as well as projectile motion and the collisions of elastic and inelastic bodies. These subjects give his book a substantial overlap with earlier textbooks, such as J. T. Desaguliers's *A Course of Experimental Philosophy* (1734) and even Jacques Rohault's much earlier *Treatise of Mechanics.* Moreover, each edition of Helsham's book beyond the first included an appendix with worked problems. When you add it all up—and throw in Helsham's chapters on hydrostatics, pneumatics, and sound—the physics required of premeds has changed very little in the last two hundred years.

Although Helsham's textbook is available in