copy of his sumptuous, illustrated first Leiden edition of 1732. In this chapter, Powers does briefly discuss the fact that Boerhaave does not mention Stahl's phlogiston theory anywhere in his *Elementa Chemiae*. He notes that Boerhaave's *pabulum ignis*, compared by some modern day scholars to phlogiston, was presented as "the material cause of inflammability… needed to interact with instrumental fire… for combustion to occur." Stahl's phlogiston, by contrast, was considered to be the very substance of fire "fixed" in an inflammable body. The final chapter ("From Alchemy to Chemistry") describes Boerhaave's investigations and teachings over three decades of the mercurialist theory of chemistry. Essentially the concept that all metals shared a rarified form of mercury gave some theoretical support to the possibility of transmuting metals. However, Boerhaave's devotion to experimental testing of theory led him to discredit this notion. In considering the credulity to the notion of transmutation by outstanding minds of the period (Boerhaave and, earlier, Boyle and Newton), it is well to remember that it was only near the end of the eighteenth century that Lavoisier provided a useful definition of the term "chemical element."

Professor Powers' book is a concise work, dense with information, yet highly accessible for historians and non-historians alike. In each of seven chapters, followed by a section titled CONCLUSION ("Boerhaave's Legacy"), the author provides an outline at the start and a brief, helpful wrap up at the conclusion. There are 30 pages of Notes, nicely indexed both to chapter and also in the running header to pages. This is followed by a 21-page bibliography and an adequate index that occasionally misses important specifics- for example, le Fèvre and Glaser are important chemists, discussed in the body of the book, but missing in the index.

Arthur Greenberg, University of New Hampshire, Durham, New Hampshire, art.greenberg@unh.edu

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Sir James Dewar, 1842-1923: A Ruthless Chemist, J. S. Rowlinson, Ashgate, Farnham, 2012, xviii + 236 pp, ISBN 978-1-4094-0613-6, $124.95.

The dictionary defines a clerihew as a "whimsical, four-line biographical poem" invented by the British humorist, Edmund Clerihew Bentley (1875-1956), while still a 16-year old schoolboy. One of his earliest attempts is an example well-known to historians of chemistry:

> Sir Humphry Davy
> Abominated gravy.
> He lived in the odium
> Of having discovered sodium.

Recently I had occasion to examine Bentley's first published collection of clerihews, *Biography for Beginners* (London, 1905), and was delighted to discover that, in addition to Davy, yet another chemist was embedded among the many satirized literary figures, politicians, philosophers and theologians:

> Professor Dewar
> Is a better man than you are,
> None of you asses
> Can condense gases.

Aside from the rather exaggerated pronunciation of Dewar required to make the rhyme work, this little ditty is of interest for two reasons. First, it focuses on Dewar's later work on the liquefaction of gases at low temperatures, which led in turn to his development of the vacuum flask or thermos bottle—probably the only aspect of his career known to most present-day chemists. In recognition of this accomplishment, the vacuum flask—at least among American chemists—is often referred to simply as a "Dewar."

Second, there is a suggestion of intellectual arrogance on the part of Dewar—an aspect of his personality also reflected in the subtitle of the book under review: *A Ruthless Chemist*. Though short biographical summaries of Dewar's life and career have long been available, this is the first book-length study of this talented, albeit irascible, Scottish chemist. Its author, Sir John Rowlinson, is well-known among physical chemists for his work on the theory of liquids and liquid mixtures, and is increasingly known among historians of science as well for such works as his reprinting with commentary of the English translation of J. D. van der Waals' classic 1873 thesis, *On the Continuity of the Gaseous and Liquid States*

(Amsterdam, 1988); his coauthoring (with A. Y. Kipnis and B. E. Yavalov) of the biography, *Van der Waals and Molecular Science* (Oxford, 1996); his magisterial study, *Cohesion: A Scientific History of Intermolecular Forces* (Cambridge, 2002); and, most recently, his coediting of the volume, *Chemistry at Oxford: A History from 1600 to 2005* (Cambridge, 2009).

Rowlinson's path from the work and life of van der Waals and the history of the study of molecular cohesion to the life of Sir James Dewar is perhaps a natural one, given Dewar's experimental contributions to the study of the liquefaction of gases mentioned above. But, of course, a reading of his book quickly reveals that this was but one aspect of Dewar's long and fruitful career. Trained in chemistry at the University of Edinburgh under Lyon Playfair and Alexander Crum Brown, Dewar's first publications were in the field of organic chemistry, including the invention of a flexible two-dimensional mechanical model to illustrate the application of Crum Brown's topological bonding symbolism to the problem of the structure of benzene, and his proposal that pyridine had an analogous aromatic ring structure. This led to postgraduate work in the laboratory of Kekulé at Ghent, after which he held a series of short-term appointments at Dick College and the Highland and Agricultural Society of Scotland. Finally, in 1875, at age 33, Dewar was appointed Jacksonian Professor of Natural Philosophy at Cambridge University, followed two years later by a concurrent appointment as the Fullerian Professor of Chemistry at the Royal Institution in London. These events were accompanied by an increasing preference for work in the field of physical chemistry and experimental physics. Thus, while at Cambridge, he initiated a long series of researches in the area of atomic spectroscopy in collaboration with the Cambridge Professor of Chemistry, George Liveing, and it is largely in connection with his appointment at the Royal Institution that he began his best-known work in the field of cryogenics, including both gas liquefaction and the measurement of physical properties at low temperatures. In between he found time to do work on the metal carbonyls and to invent, in collaboration with Frederich Abel, the explosive known as cordite—a commercial venture that led to a long and acrimonious dispute with Alfred Nobel over patent rights. Nor was Dewar's combative behavior reserved for commercial competitors, as throughout his career he also managed to become entangled in personal disputes with both his scientific competitors and with many of his colleagues and assistants—whence Rowlinson's choice of subtitle.

Unlike many biographies of scientists by professional historians and science journalists in which little is said of the scientist's actual laboratory work for fear it will turn off the lay reader, Rowlinson takes great pains to explain the nature of Dewar's work and has included many diagrams illustrating the apparatus used. About the only criticism I would have is the absence of a similar series of photos illustrating Dewar's personal life (i.e., his appearance at various ages, his family, his close friends and associates, etc.)—the only photo of him in the entire book being the frontispiece, which shows the famous portrait taken by his assistant, Alexander Scott, in which Dewar is examining a vacuum flask in his laboratory at the Royal Institution. But this is a purely personal bias and should not deflect the interested reader from acquiring and enjoying this informative biography.

William B. Jensen, McMicken Professor of Chemistry, University of Cincinnati, jensenwb@ucmail.uc.edu

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Progresive Enlightenment: The Origins of the Gaslight Industry, 1780-1820, Leslie Tomory, MIT Press, London; Cambridge, MA, 2012, 368 pp, ISBN 978-0-262-01675-9, $28.

Gas lighting was a ubiquitous western technology of the nineteenth century, yet one which has been given relatively little importance by historians in comparison to, say, the railways or electricity networks. In *Progressive Enlightenment*, Leslie Tomory successfully argues that there should be a more prominent place for gas lighting in discussions of large-scale "network" technologies of that era. In this detailed study, Tomory traces the origins and development of the gas lighting industry from experiments in the pneumatic chemistry of inflammable airs in the eighteenth century to the widespread distribution and utilization of coal gas for lighting streets, homes, and factories in the first decades of the nineteenth century.