(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.

In the process, Tomory engages with broader historiographical issues relating to the history of technology and economic history. The first involves locating gas lighting in different stages of invention and innovation that are identified as characterizing the Industrial Revolution. A "first wave" of technologies had little use for science and entailed invention by individuals and small partnerships. Gas lighting belonged to a "second wave" of technologies which demanded large-scale capital investments and had their foundation in recent or current scientific research. Tomory also situates gas lighting in broader debates about the nature of Joel Mokyr's notion of the "Industrial Enlightenment" concerning the place of scientific knowledge in the development of industrial enterprises in Europe. With qualification, Tomory supports Mokyr's interpretation by proposing that gas lighting represents a fairly clear-cut example of chemical know-how obtained from the laboratory being applied to the creation of a successful industrial product. Gas lighting was "a major first step" in the fulfillment of the "Enlightenment dream of science at the service of industry" (pp 3-4, 239).

Progressive Enlightenment is divided into two parts. The first part proposes a "two traditions" explanation of the emergence of gas lighting as an industrial enterprise in the early nineteenth century. Tomory claims that gas lighting only emerged when a natural philosophical tradition of pneumatic chemistry and an industrial tradition of destructive distillation came together around 1800 (discussed respectively in chapters 1 and 2). Tomory contrasts this account with internalist histories which root gas lighting in various discoveries of the inflammability of coal gas in the seventeenth century, and histories which see more continuity between the nineteenth-century industry and various projects using inflammable air to generate light in the late eighteenth century. While the former account cannot explain why gas lighting did not emerge as soon as the discovery of its inflammability was made, the projects of the latter account cannot be true precedents because they were not "transformed into a commercial technology" (p 9). To make this argument depends, of course, on how one defines "commercial," and if one's definition of gas lighting is that it was an industry, then inevitably an enterprise which was not industrial cannot be equated with the full fruition of gas lighting as a technology.

Part two explores in fine detail the scaling-up of gas lighting from small and scattered projects to an expansive network in the first decades of the nineteenth century. First came the development of stand-alone gas lighting plants manufactured by Boulton and Watt with the help of William Murdoch between 1802 and 1810 (chapter 3). Then came the creation of a fully-fledged gas lighting network by about 1820 (chapters 4 and 5). In Britain this was the work of the Gas Light and Coke Company which emerged from the efforts of German immigrant Frederick Winsor to found a "National Light and Heat Company" in the first years of the nineteenth century. The book ends rather abruptly in 1820, as British gas lighting was about to gain widespread use across continental Europe (a story which itself would be deserving of a monograph).

In concluding, Tomory qualifies traditional views that gas lighting succeeded in Britain while it failed on the continent by pointing to the distinctive place of coal in the British economy. Continental manufacturers did not fail to produce what Britons achieved with gas but instead went down a different path to the production of wood distillates. Hence local conditions shaped technological paths and "there was no failure of technical imagination on the Continent" (p 241). Tomory also highlights the importance of display in the history of gas lighting, its links to old traditions of fireworks and illuminations, and its frequent exploitation of garish advertising and provocative publicity. There is also valuable discussion of the historiography of entrepreneurship and why users matter in the history of technology. In relation to the history of chemistry, Tomory's study is valuable for broaching common boundaries drawn between the era before and after Lavoisier, and for investigating the links between chemistry and industry. Some might dispute the boundaries erected from the outset between science, technology, commerce, industry, and invention, and Mokyr's interpretation of the period has not been without its critics. But this is an important contribution to the history of gas lighting and is successful in staking a place for gas lighting in the economic and technological history of the era.

Simon Werrett, University College London, Department of Science and Technology Studies, s.werrett@ucl.ac.uk