cant discussion of the structure, operations, and politics of global petroleum markets. There is also little coverage of the ongoing deregulation of the gas and electricity industries.

Combined with other more analytical materials, *Consuming Power* would be a useful addition to the reading list for an introductory undergraduate course on the social history of energy. Serious students of energy, looking for historical insights that might help the United States to better navigate the next few decades of energy policy, will find little here that is directly helpful. However, the book's rich descriptive detail might help to stimulate interest and lay the groundwork for more analytical treatments.

Reference

1. For example, T. C. Schelling, *Micromotives an Macrobehavior* (Norton, New York, 1978).

HISTORY OF SCIENCE

The Civic Importance of Chemistry

Mark R. Finlay

Justus von Liebig. The Chemical Gatekeeper. WILLIAM H. BROCK. Cambridge University Press, Cambridge, 1997. xiv, 374 pp., illus. $79.95. ISBN 0-521-56224-4.

In the 1860s and 1870s, several companies based in Europe, the United States, South America, and Australia marketed a product they called "Liebig's Extract of Meat." A result of the teachings of the German chemist Justus von Liebig (1803–1873), this thick, dark brown fluid, with a powerful aroma of beef, had become a common commodity as a medicine, portable food, and soup starter in middle-class kitchens. The Liebig Extract of Meat Company, the firm that first entered this market and represented Liebig's own financial interests, repeatedly sued its imitators for abuse of the chemist's name and trademark. In every case, courts ruled that the Liebig name and Liebig's ideas were so widely known that no single company could claim a trademark. The aim of William Brock's fine biography is to make Liebig's name as recognizable today as it was a century ago.

Brock is one of the most distinguished historians of chemistry and has already proved his talent for making the history of science come alive through biography with his *Norton History of Chemistry* (1993). A biographer could not wish for a more intriguing subject than Liebig. Born in a middle-class household in Darmstadt, Justus von Liebig went on to the University of Bonn at age 17, despite not having completed his studies at the Gymnasium. He then followed his chemistry professor to the University of Erlangen, where he became involved in a scuffle with local police and a brief but passionate affair with the poet August von Platen. While Liebig continued his studies in Paris, he evidently arranged to have a doctorate granted from Erlangen in exchange for a substantial fee and the promise to conduct research that would supplement his one-sentence dissertation.

Later in his career, Liebig conducted macabre experiments testing the flammability of human flesh, joined a scheme to sell an inferior substitute for the important drug quinine, and engaged in nasty disputes and slanderous quarrels with several of his professional rivals. Despite the shady and unpleasant aspects of Liebig's character, Brock deals with his subject fairly and sympathetically, devoting just as much attention to his friendships, family ties, genuinely humanitarian concerns, and ability to recognize when to drop old battles and begin new ones.

Brock organizes the bulk of the text thematically, enabling him to delineate in rich detail how Liebig shaped 19th-century science in multiple ways. Though Liebig was not responsible for one particular chemical discovery, his perfection of combustion analysis techniques and his ability to propose bold theoretical frameworks guided many developments in organic, pharmaceutical, physiological, agricultural, and industrial chemistries for decades. As an educator, he developed systematic means to train students and colleagues to pursue the research questions that he laid out. As a popularizer of science, Liebig prodded academics, bureaucrats, farmers, and monarchs to recognize chemistry's utility as an untapped source for national wealth and modernization, as a foundation for improvements in public health and nutrition, and as a basis for greater international cooperation. And, as an entrepreneur, he demonstrated the commercial potential of applied chemistry through enterprises that manufactured fertilizers, mirrors, baking powders, infant formulas, and the extract of meat. Later in his career, Liebig relished the role of savant and citizen of the world, shifting his interests from specific disciplinary questions in chemistry and agriculture to address broader philosophical, methodological, and social issues.

Brock's study develops two themes as its framework. The first is the notion of Liebig as "the chemical gatekeeper," referring to his role as an "entrepreneur and propagandist for the extension of chemistry's boundaries." As the founder of the era's most important academic program in chemistry, as editor of the leading journal in the field, and as one who held tremendous influence over employment opportunities for 19th-century chemists, Liebig shaped the path of chemistry's emergence as an independent discipline. Brock describes the small, but important, ways in which Liebig tended this gate. For instance, by convincing university officials to shift his students from the medical faculty to the arts faculty, Liebig saw to it that chemistry was no longer treated as a subject ancillary to medical training. By demanding a stipend to cover the expenses of operating his laboratory, Liebig dismissed the notion that laboratory instruction was the professor's personal expense—and was thus often ignored in the training of chemists. Brock also emphasizes Liebig's strategy of using the dedication page of his books to pay homage to and generate support from politicians, aristocrats, and colleagues.

Brock makes his most original contributions through his second theme: a thorough treatment of Liebig's relationship with the British. Liebig traveled to Britain six times during his career, where his contributions to the Royal College of Chemistry, to industrial chemistry firms, to medical theory and practice, and to debates about the treatment of London sewage made him as well known in Britain as on the Continent. Liebig's fondness for British culture and his British colleagues was genuine, but, as Brock perceptively points out, it served a strategic purpose as well: Liebig recognized that his hopes for the widespread application of science to society could not reach fruition unless Britain led the way.

The career of Liebig raises many questions concerning the differences among national and international models of scientific practice, the tensions between pure and applied chemistry, and the scientist's position amid competing pressures from academia, industry, and the state. In general, Brock does not push his analysis of this interplay as far as he could, and many of these questions remain unanswered. As a whole, however, Brock's work brings to the English-speaking world a long-awaited biography of one of the most important figures in the history of chemistry. In what is perhaps the most significant lesson that emerges from this study, Brock shows how Liebig was a "public scientist," recognizing and embracing the civic importance of his science in the modern world. It would be a pity if his notion disappeared.

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