fundamental science, the boundaries of which he tried to extend from about 1840 into enterprises which he regarded as contiguous. In a series of thematic chapters we learn about Liebig's activities in industry, agriculture, physiology, pathology, and public health. He was thus the chemical gatekeeper of Brock's sub-title. He was also an effective popularizer of chemistry and a philosopher of science, who condemned what he regarded as the naïve inductive philosophy of Francis Bacon.

Brock is particularly revealing about Liebig's medical interests. His agricultural chemistry was based on the idea of giving mineral medicine, and not manure, to the land; this view was stoutly opposed by John Bennet Lawes and Joseph Henry Gilbert (a former pupil of Liebig) working together at Rothamsted. Liebig's contributions to animal or physiological chemistry, now called biochemistry, were equally contentious. His views about fat metabolism, protein degradation, and fermentation generated sustained and acrimonious controversies. For example, Jöns Berzelius publicly criticized Liebig's physiological chemistry as facile because it was created at the writing table; privately he denounced it as drivel. At the end of Liebig's life Pasteur had pushed him into a paradoxical position: though Liebig accepted that yeast was a living organism, he maintained his original stance on the essentially chemical nature of fermentation. In the field of public health, Liebig had the temerity to pen *Letters on the subject of the utilization of the metropolitan sewage addressed to the Lord Mayor of London* in 1865. Comfortably ensconced in Bavaria from 1852 as professor of chemistry at the University of Munich, where he did little laboratory work, and from 1858 as perpetual president of the Bavarian Academy of Sciences, he advocated unsuccessfully the intermittent hosing and spraying of land with town sewage and opposed using it to irrigate sandy areas to create sewage farms. In the vexed matter of theories of disease Liebig was influential: from the 1840s until the 1880s many theorists used his chemical process model. In the 1860s Liebig became obsessed with nutrition, not just intellectually but also commercially. Though his extract of meat was quickly shown to be less nutritious than he supposed, he founded the Liebig Extract of Meat Company which made a fortune for him; after his death it became famous for its Fray Bentos Corned Beef and Oxo. Sadly Liebig's diet of cognac, wine, and his own meat extract did not prevent his death from pneumonia. As a business man, Liebig was also involved in successful ventures with baking powder and with malted and dried milk sold as infant foods.

Brock's is the first English-language biography of Liebig since William Shenstone's hagiographic account of 1895. Those who read German fluently may still turn with profit to the biography published in 1909 by Jacob Volhard, a pupil and friend of Liebig. Brock says modestly that his book should be regarded as complementing but not replacing Volhard. I beg to demur. Drawing on a wide range of primary and secondary sources, Brock gives us new insights and information about the familiar and unfamiliar aspects of Liebig's personality and career. With meticulous but easily carried scholarship he quietly corrects errors made by other historians including myself. His prose is lucid, flowing, and sequacious. Without any Latourian jargon he depicts the Liebigization of not just Germany but much of Europe. There is no doubt that this accomplished book deserves to be the standard biography of Liebig for many years to come.

Jack Morrell, Bradford, Yorkshire

Andrea A Rusnock (ed.), *The correspondence of James Jurin (1684–1750): physician and secretary to the Royal Society*, Clio Medica 39, Wellcome Institute Series in the History of Medicine, Amsterdam and Atlanta, Rodopi, 1996, pp. viii, 577, Hfl. 275.00, $171.00 (hardback 90-420-0039-2), Hfl. 75.00, $46.50 (paperback 90-420-0047-3).

The correspondence of James Jurin, a mathematician and physician who served as

secretary of the Royal Society of London during the last six years of Newton's presidency, has several claims on the attention of historians. It chronicles Jurin's campaign during the 1720s in favour of inoculation against smallpox and his simultaneous organization of an international network for the collection of meteorological information; many of the same correspondents provided data on the effectiveness of inoculation and the capriciousness of the weather. Jurin was one of the leading defenders of Newtonian thought from a few years before until long after his spell as the Royal Society's secretary; the correspondence tracks his defence of Newton's mathematics and fluid dynamics and his battle against challengers, to priority and to principle, from Liebniz to Mme du Châtelet. As editor of the *Philosophical Transactions*, Jurin had to determine what the readership regarded as falling within the Royal Society's purposes; in many of the letters published by Andrea Rusnock, Jurin offered advice to would-be contributors, amending, correcting, and delimiting their material. The scope of his work staggers the modern underfurnished mind. Jurin was at home with analytical mechanics, natural philosophy, medical practice, and Greek inscriptions, among other things.

Since Jurin kept copies of his outgoing letters, his surviving correspondence is unusual not only in its scope and size, but also in presenting both sides. Some 700 letters by or to him are known; of these, Rusnock prints 270, covering the years 1703 to 1749; all are calendared in an appendix with indications of their contents. The transcriptions from English originals seem to be accurate; letters written in French or Latin are present only in English translations, which read well, and, we must suppose, faithfully. The annotations consist mainly of brief identifications of people and publications mentioned in the letters. That is no doubt helpful, but also misleading; brevity has encouraged use of titles and concepts foreign to the eighteenth century, like "physicist" and "biologist", which introduce an inappropriate sense of professionalism. For xample, Francesco Bianchini appears as "physicist and mathematician", whereas his chief occupation at the time of the correspondence was supervisor of the antiquities of Rome. Perhaps the most instructive feature of Jurin's correspondence, apart from the odd facts important for one or another specialist, is how much the distinctions and pigeonholes necessary to our understanding of our time miss the realities of the first half of the eighteenth century.

But there is much for the specialist too. Readers of this journal will probably find Jurin's work on smallpox most interesting; his calculations of the relative risk of dying from the disease contracted naturally and by inoculation appear to be the first of their kind. He considered this work, together with his version of a cure for the stone, to be his monument. Also, his meteorological survey, promoted through physicians persuaded of a link between climate and disease, touches significant themes in the history of medicine.

Rusnock has enriched her edition with a good beginning of a biography of Jurin. She emphasizes his education at Christ's Hospital in London and Trinity College, Cambridge; his contributions to the spread of Newtonianism outside England; his passages at arms with Bishop Berkeley closer to home; and, of course, his championing of inoculation. Although, as she says, the choice of 270 letters from 700 involves arbitrariness, most readers will agree with her decision to print all of those from well-known figures like Buffon, Fontenelle, Leeuwenhoek, Cotton Mather, and Voltaire. The exchanges with Fontenelle are by far the most interesting as indicating the perplexities into which consideration of the infinite in mathematics still involved arithmeticians on the eve of the Age of Englightenment. If I understand Fontenelle correctly, he would have said that the price of Rusnock's book in paperback is finite and that of the hardback as close to infinity as the publisher dared to go.

J L Heilbron,
Worcester College, Oxford